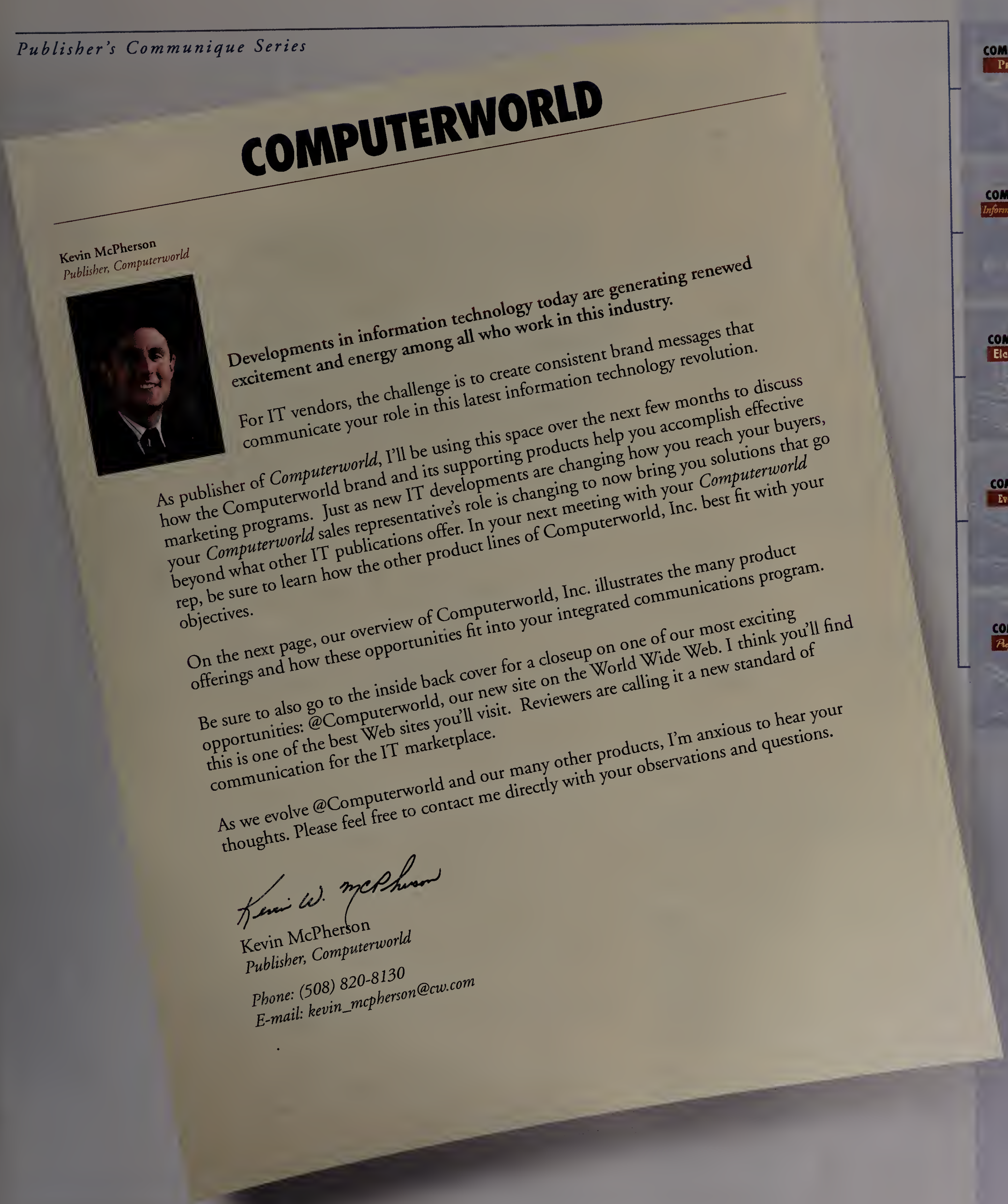
Publisher's Communique Series



COMPUTERWORLD

Kevin McPherson
Publisher, Computerworld

Developments in information technology today are generating renewed excitement and energy among all who work in this industry.

For IT vendors, the challenge is to create consistent brand messages that communicate your role in this latest information technology revolution.

As publisher of *Computerworld*, I'll be using this space over the next few months to discuss how the Computerworld brand and its supporting products help you accomplish effective marketing programs. Just as new IT developments are changing how you reach your buyers, your *Computerworld* sales representative's role is changing to now bring you solutions that go beyond what other IT publications offer. In your next meeting with your *Computerworld* rep, be sure to learn how the other product lines of Computerworld, Inc. best fit with your objectives.

On the next page, our overview of Computerworld, Inc. illustrates the many product offerings and how these opportunities fit into your integrated communications program.

Be sure to also go to the inside back cover for a closeup on one of our most exciting opportunities: @Computerworld, our new site on the World Wide Web. I think you'll find this is one of the best Web sites you'll visit. Reviewers are calling it a new standard of communication for the IT marketplace.

As we evolve @Computerworld and our many other products, I'm anxious to hear your thoughts. Please feel free to contact me directly with your observations and questions.

Kevin W. McPherson

Kevin McPherson
Publisher, Computerworld

Phone: (508) 820-8130
E-mail: kevin_mcpherson@cw.com

COMPUTERWORLD
PRINT MEDIA

COMPUTERWORLD
Information Management

COMPUTERWORLD
Electronic Media

COMPUTERWORLD
Events & Conferences

COMPUTERWORLD
Professional Development

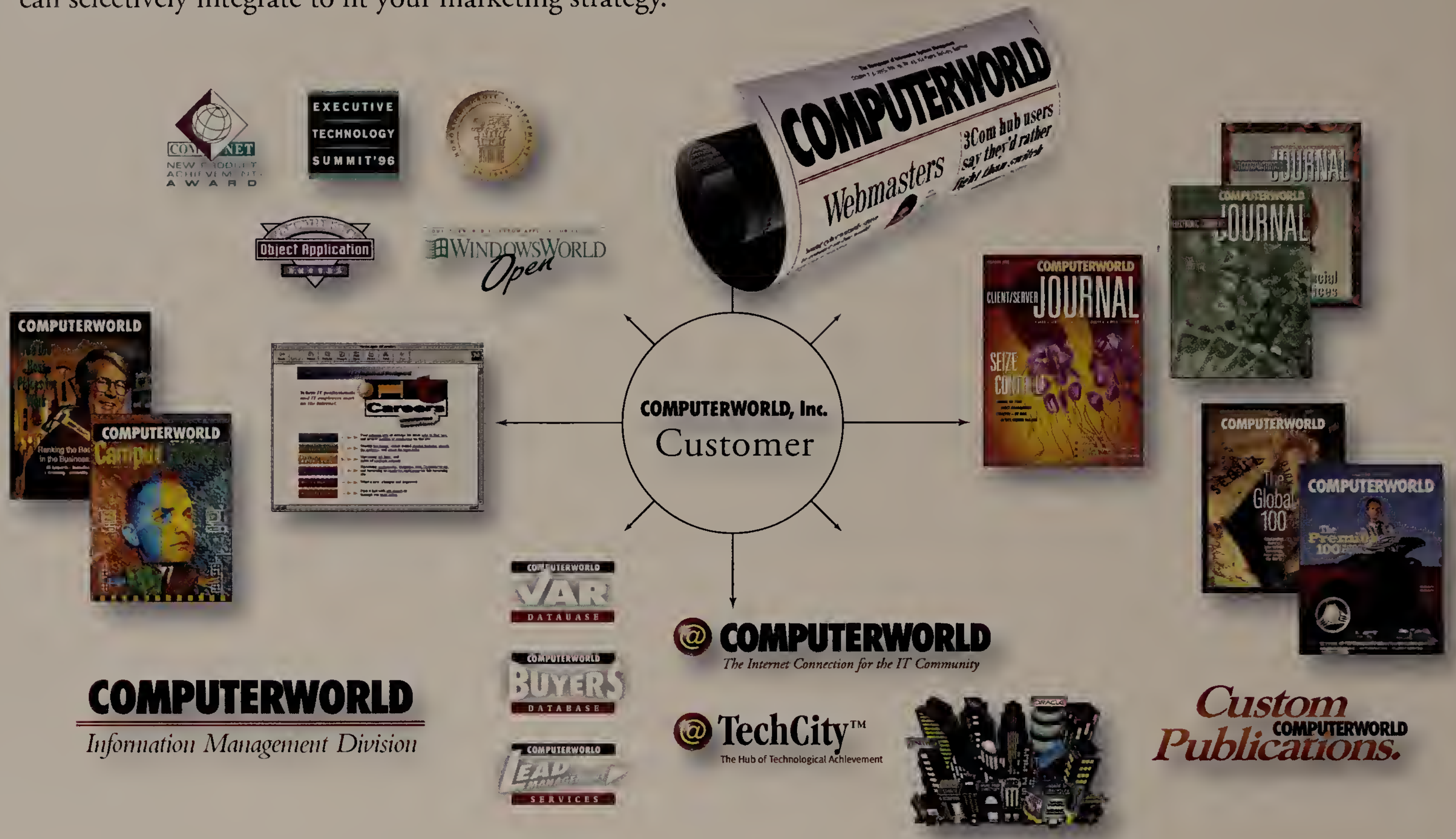
Newspaper

COMPUTERWORLD
Everything you need to know.

COMPUTERWORLD, Inc.

Leadership. Innovation. Integration.

What is Computerworld? Its strength of brand has brought about an expansion of media solutions in addition to the weekly newspaper that has served information systems professionals for over 28 years. Solutions that you can selectively integrate to fit your marketing strategy.


COMNET New Product Achievement Award
EXECUTIVE TECHNOLOGY SUMMIT'96
Object Application Awards
WindowsWorld Open
COMPUTERWORLD
3Com hub users say they'd rather fight than switch
Webmasters
COMPUTERWORLD JOURNAL
Careers
COMPUTERWORLD, Inc.
Customer
COMPUTERWORLD VAR DATABASE
COMPUTERWORLD BUYERS DATABASE
COMPUTERWORLD LEAD MANAGEMENT SERVICES
COMPUTERWORLD Information Management Division
@COMPUTERWORLD The Internet Connection for the IT Community
@TechCity™ The Hub of Technological Achievement
The Global 100
The Premier 100
Custom COMPUTERWORLD Publications.

COMPUTERWORLD Print Media
COMPUTERWORLD Information Management
COMPUTERWORLD Electronic Media
COMPUTERWORLD Events & Conferences
COMPUTERWORLD Professional Development

The Computerworld Brand: Connecting you to those who buy IT.

Connecting through a multitude of print media choices:

- *Computerworld*, the leading weekly newspaper for information systems professionals for 28 years
- *Computerworld Client/Server Journal*, our bimonthly magazine serving our readership's extended information requirements on distributed computing and which includes vertical industry editions:
  Computerworld Financial Journal
  Computerworld Healthcare Journal
  Computerworld Retail Journal
  Computerworld Telecomm Journal
- Special focus publications and special reports including:
  Computerworld Premier 100 and *Global 100*
  Computerworld IS Leadership Series
  Computerworld IS Salary and Skills Survey
- Custom publishing – with nearly 100 advertising supplements published in four years, Computerworld Custom Publishing is a highly regarded opportunity for vendors who want to authoritatively position their technology solution.

Connecting through electronic media:

- @Computerworld, a unique Internet connection to the IT community.
- @TechCity, offering you a "new world" type of electronic marketing opportunities

Connecting through database & lead management services:

- Computerworld Buyers' and VAR profiles that detail your prospects' buying habits
- Lead Management Services – inquiry management systems, seminar registration and tradeshow fulfillment

Connecting through event marketing:

- Computerworld Smithsonian Awards
- Executive Technology Summit
- Computerworld User and Product Achievement Awards – Windows World Open and Object Application Awards, ComNet New Product Achievement Awards and RealWare Product Achievement Awards

Connecting through the IT careers environment:

- *Computerworld's* weekly Careers advertising section
- *Computerworld Best Places to Work* and *Campus Edition* annual magazines
- Center for Career Development Home Page, linked to @Computerworld
- Corporate Technical Recruiting Conference
- Conference on Worldwide Information Systems Education

The Newspaper of Information Systems Management
February 26, 1996, Vol. 30, No. 9, 156 Pages, $6/Copy, $48/Year

COMPUTERWORLD

IN THIS ISSUE:
Special systems integration report
Follows page 64

Visual tool eases Java development

By Frank Hayes

Think of it as "Visual Basic for Java."

Rogue Wave Software, Inc. this week will roll out JFactory, a $495 visual development environment for Java, Sun Microsystems, Inc.'s development language for the Internet. And unlike most Java development systems, JFactory is much more than a gussied-up code editor.

"You can basically prototype your whole user interface, create your menus and hook up menus and buttons to dialogs and windows — without writing a single line of code," said beta user Mark Rhoads, vice president of software engineering at Information Presentation Technologies, Inc. in San Luis Obispo, Calif.

"We've spent the last six months building a front-office trading system, with the front end being in Java," said Steve Yalovitser, a consultant for Chemical Banking Corp. in New York. "The poor guy who built the user interface by hand, when I showed him JFactory, was ready to drop everything and just use this

Java, *page 15*

Duke Power *shifted to in-house development on DB2 mainframes and Windows clients after its ambitious project with Oracle failed*

Utility unplugs object project

By Thomas Hoffman and Julia King

Duke Power Co. pulled the plug on a $23 million object-based customer information system after Oracle Corp. failed to deliver it within a promised two-year window, *Computerworld* has learned.

Last week, Duke executives declined to disclose how much money the company lost through its abandoned Project Sea Green effort.

Oracle was supposed to deliver the object-based customer system in one "big bang" by the end of last year, Duke officials said. But the utility balked when Oracle asked for yet another two years to complete it.

A former Duke systems analyst said "zero percent" of the object investment is recoverable. The Charlotte, N.C.-based utility is consequently being forced to take a $12 million charge against its fiscal 1995 revenue, said the systems analyst, who asked to remain anonymous.

Utility unplugs, *page 125*

Hot seat!

Support, NT server troubles plague Netscape

By Kim S. Nash

Netscape support issues

User complaints about poor technical support and unreliable World Wide Web servers have begun to ding the armor of Internet knight Netscape Communications Corp.

Several users last week cited problems with Netscape's Windows NT products and with technical support in general. But the vendor's Unix line, from which the NT servers were ported, appears to be unaffected.

Bug fix in the works

Netscape acknowledged the problems and was eager to right past wrongs.

"One of our biggest challenges has been scaling our support operations to handle a customer base that's gone from zero to 25 million in two years," said David Pann, a server product manager at Netscape in Mountain View, Calif.

Meanwhile, a bug fix for the NT version of Commerce Server, Release 1.13, is expected to be ready for downloading from Netscape's Web site (http://www.netscape.com) this week or next, he added.

One user who had problems was United Video Satellite Group, Inc., which saw Netscape's $1,295 Commerce Server mysteriously crash several times during the 90 days it ran at the cable and satellite company in Tulsa, Okla.

United Video was running six do-

Netscape, *page 125*

Look Out, Here Comes India

U.S. companies: Meet your new competitive weapon.
U.S. programmers: Meet your new rival.

RAGHU RAI/MAGNUM PHOTOS

His name is Ashok Shantha Narendra Kumar, or Naren for short. He's 23 years old, works for a leading Indian software company in Bangalore, makes the equivalent of $4,500 a year — and might be working on a project for your company.

There are about 130,000 highly skilled programmers just like Naren in the Indian labor market, and some 20,000 new ones enter the workforce every year. Is he your company's next secret weapon or the bane of your existence?

See In Depth, page 100.

Server bundle = free switch

LinkSwitch sales

3Com officials claim the company sells a LinkSwitch 1000 every 10 minutes.

By Bob Wallace and Bob Francis

The hot deal this week: Buy two servers, get an Ethernet switch — worth almost $5,000 — free. That's a first.

And that's what Dell Computer Corp. will formally announce as part of an ongoing alliance with switching giant 3Com Corp. Dell will bundle two of its Pentium-based servers, with a 12-port 3Com Ethernet LinkSwitch 1000 thrown in for free.

Though internetworking vendors have slashed prices on their switches in the past year, no vendor has given away switches until now. 3Com, which already leads the desktop Ethernet switch market, wants to pad its lead over aggressive rivals.

Dell's so-called Bandwidth Booster Bundle eliminates bottlenecks in client/server networks by install-

Free switch, *page 16*

Newspaper

A PUBLICATION OF IDG

Inside Computerworld

Feb. 26, 1996

News

NEWS

4 IBM notebooks
IBM will flesh out its portable lines with a series of "value" notebooks — and is going full steam ahead with its plans for a low-cost Internet terminal.

6 In-security
Users never can completely trust their encryption systems.

8 Microsoft reorg
Despite his denial that he'd create an Internet division, last week Microsoft Chairman Bill Gates took it all back.

10 Oracle tools
Oracle will begin shipping servers and tools that manage multiple types of data.

29 Same old, same old
Since IBM bought Lotus last June, Notes users have been relieved to see business as usual.

OPINION

36 Setting limits
Much as he abhors censorship, Paul Gillin makes the case for some limits on the Internet.

37 Data warehousing
Michael Cohn says there are a thousand reasons not to build a data warehouse.

37 Leap-year logic
Michael D. Lips tells the colorful tale of how a pope's calendar fixes may crash your systems.

126 Migrate, schmigrate
Who needs to migrate? A user group likes what it sees of the Win 95 interface included in NT, Charles Babcock reports.

COMPUTERWORLD's
TechnoTrivia
DO YOU KNOW
• • •
In what year did *Time* name the computer its "Man of the Year?"
The answer is in these pages! Now through May you can play COMPUTERWORLD's game of information retrieval — and turn trivia into treasure!
See page 28 for "everything you need to know to win!"

Choice Cuts

More than 50 vendors support *a standard for adding 3-D to the Internet.* See page 65, The Internet section

Change in the weather. *We ask three experts if the decentralization front has blown itself out.* See Managing, page 78

Software analyst Chuck Phillips *of Morgan Stanley chronicles CA's quiet, but substantial, rise on Wall Street.* See Finance & Investing, page 122

Technical Sections

SERVERS & PCS

41 PC backup
Digital linear tape is an ever-popular means to back up high-end PC servers. But another technique from Exabyte is coming along that could give it some serious challenge.

44 Internet terminals
Hewlett-Packard is offering multimedia versions of X Window System terminals for use as Internet access stations.

SOFTWARE

49 Distributed apps
Client/server applications grow up — and out.

54 Closer Look
Unix and OS/2 so far have been successful in their hunt for niches that are safe from Microsoft's blood lust.

THE ENTERPRISE NETWORK

57 Infer-structure
Group calls for users, vendors to take the hype out of "information hypeway."

60 NetWare tools
NetWare management tools keep on rolling out.

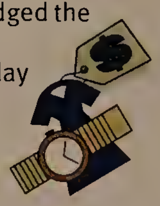
THE INTERNET

65 Intranet wares
These days, intranets — internal programs that run over protected parts of the public Internet — are a lot like presidential candidates: You hear a lot about them, but you're not quite sure what they can do for you. Several vendors aim to show you with new products due out soon.

66 Banyan's plans
Banyan is going Internet with a new division and a bunch of E-mail products for businesses and consumers.

CORPORATE STRATEGIES

73 What holiday woes?
Pier 1 Imports dodged the industrywide downturn in holiday shopping, due partly to the success of a homegrown inventory management system.



76 Software savings
Blue Cross/Blue Shield of Minnesota expects to save $1.7 million in software costs by 1999, thanks to a mainframe-based audit package it's using.

Features

MANAGING

80 You're boss. Now what?
Becoming a manager inspires everything from elation to terror. Tips from some who made the transition.

BUYER'S GUIDE

89 RAID storage
The RAID storage market is exploding, which makes options plentiful for buyers in the Unix and mainframe sectors.

IN DEPTH

100 Look out, here comes India

CAREERS

105 Systems analyst skills
Making the move to systems analyst requires strong business and people skills.

Etc.

April Workshops ____ 84
Company Index ____ 124
Editorial/Letters ____ 36
Finance & Investing ____ 122
F.Y.I. ____ 79
How to contact CW ____ 124
Inside Lines ____ 126
Stock Ticker ____ 123

IS YOUR BACKUP TOUGH ENOUGH FOR THE JOB?

Is your critical data guarded by a puny backup solution that doesn't scale up? Backup Express™, new from Syncsort, is fast and powerful, designed specifically for today's distributed networks, where the data grows every day. Backup Express™ backs up and restores gigabytes of data fast—whether on UNIX, NetWare, or Windows NT. If you want a backup strong enough to keep your network data secure and bring it back fast, call us.

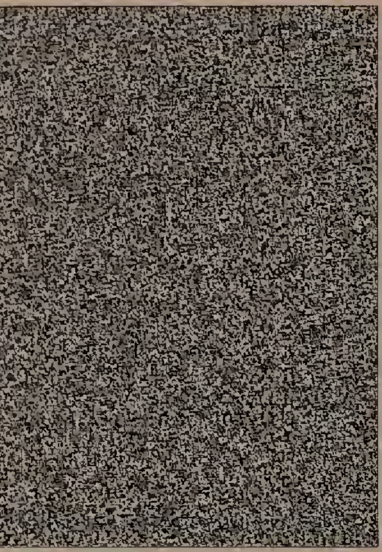
syncsort

Tel (201) 930-8200 dept. C20
Fax (201) 930-8290 dept. C20
http://www/syncsort.com

©1996 Syncsort Incorporated. All trademarks are property of their respective owners.

alt.cw

This isn't a test pattern



No, an image won't pop out if you stare at this picture long enough. This is an "infoimage," an executable computer file that can be sent by fax. InfoImaging Technologies in Palo Alto, Calif., has released 3D Fax Software, which compresses and encodes PC files into a black-and-white pattern. The image can be sent from one PC fax modem to another, or it can be printed and sent to a fax machine. The recipient can scan the image into a PC, and the software restores the file to its original computer format, including color pictures and multimedia clips.

Democracy tech

Political junkies who are trying to find meaning in the results of the New Hampshire primary and citizens who want to nail down the presidential candidates' positions on important issues can check the following Web sites:

- Real-time voting results, "insider" political commentary and campaign finance reports at **http://www.ElectionLine.com**
- Nonpartisan, comprehensive information geared to what voters want to know at **http://www.vote-smart.org/**
- Cyperpolitics with an attitude from the digerati at *Wired* magazine at **http://www.netizen.com/**
- For hands-on experience in making policy decisions, try Reinventing America, a political simulation game at **http://www.pathfinder.com/reinventing**

License plates make high-tech statement

Compiled by Kim S. Nash

- H8ORCL — on a black BMW driven by an Informix executive
- BSD UNIX — on a white Honda Accord, near Mountain View, Calif.
- NTWKGNL [Network General] — on a black Lexus in San Francisco
- 3AMD386 — on a Jeep Cherokee in California
- UZ A MAC — on a Volvo 740 in Burlingame, Calif.
- SQLTEXT — on a silver BMW 525I in California
- EWORLD [Apple's underwhelming on-line service] — on a car headed toward San Jose, with a license plate holder that says, "Try it. You'll like it."

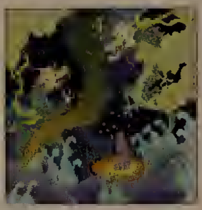
Peanuts, popcorn, software?

Snacks Treats Snacks Treats
Midway
America Online Inside
Try the nation's leading online service FREE!
Free Software • Free Trial Membership

Passengers on Midway Airlines' Boston to Raleigh flights may find a surprise shrink-wrapped with their package of peanuts: software from America Online. Can cereal boxes be far behind? — *Allan E. Alter*

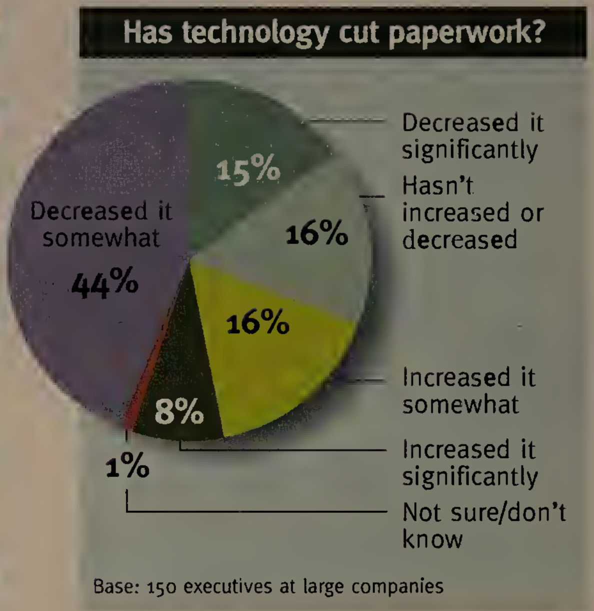
America Online diskettes are so pervasive — it seems every PC magazine has one attached somewhere — that some Usenet wags call AOL the Free Diskette of the Month Club. They say they toss the freebies into a box and use them as "scratch" diskettes for temporary files, travel and giveaways. "I'll never have to buy disks again," one collector says. "I have noticed that, after formatting them, these are the [disks] that seem to fail the most."

Send contributions of offbeat news, lists and anecdotes to mbetts@cw.com.



In a rare case of computers applied to superstition, land developers in Hong Kong use a geographic information system to avoid building in "feng shui lanes." Feng shui is the ancient Chinese practice of making sure that your building isn't located on an unlucky "dragon line" or underground river, which would knock your "celestial yin and yang" out of harmony. See the report at http://www. geoplan.ufl.edu/ ~frankz/paper/fengshui.html.

Has technology cut paperwork?



Base: 150 executives at large companies

Source: RHI Consulting, Menlo Park, Calif.

Digital Frontiers

The boisterous trading floors on Wall Street will be replaced by the kind of lightning-quick, supercomputer-driven market that operates in Switzerland, predicts John Marthinsen, economics professor at Babson College in Babson Park, Mass.

The Swiss financial markets two months ago merged into EBS (Elktronische Borse Schweize), a computerized trading system that handles stocks, bonds, commodities and derivatives. EBS processes transactions in about seven seconds. And Swiss traders and brokers can telecommute, because they don't have to be in the same place to conduct business.

Marthinsen, author of *Switzerland: A Guide to Capital Markets*, says die-hard Wall Streeters will resist the technology. But the supercomputerized market is inevitable, he argues, and will have ripple effects. For example, trading floors won't be necessary, and firms will leave high-rent financial districts.

New ThinkPads, Internet devices on way from IBM

By Jaikumar Vijayan

IBM last week drew up a Big Blueprint for its mobile PCs, sketching in an upcoming line of midrange ThinkPads and a few details about its inexpensive InterPersonal Computer (IPC) devices.

A few customers are already testing two prototype models of the IPC, which IBM Chairman Louis V. Gerstner announced at Comdex/Fall '95.

"It is not just a $300 to $500 box, but a series of new technologies," said Robert Stephenson, senior vice president and group executive at IBM.

IBM by midyear will refresh its ThinkPad line with several Intel Corp. Pentium-based "value" notebooks priced between $2,000 and $3,000.

At least one of the ThinkPads will carry a price tag of less than $2,000, IBM officials said last week in a briefing.

The notebooks, some of which will be announced in the next three months, will replace IBM's aging 486-based ThinkPad 365 models. Several will feature 12.1-in. screens.

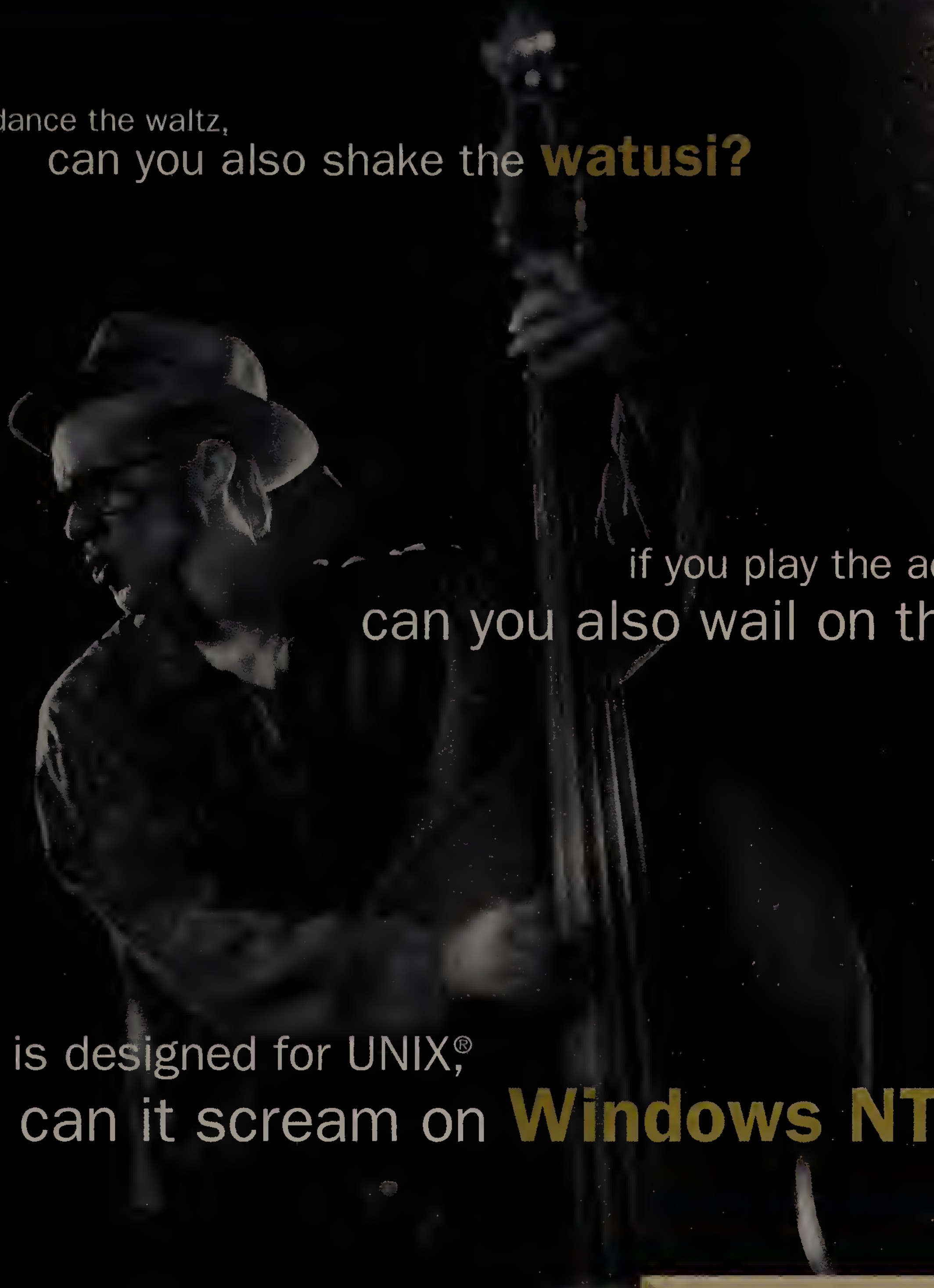
Later this year, IBM will release a Pentium-based "ultraportable" model that will fall between the 300 and 700 ThinkPad lines in performance and capabilities. Those units, which will start with 100-MHz Pentium models, will weigh 4 pounds. They will be 1.25 in. thick and have 12.1-in. screens.

"All this sure sounds encouraging. IBM has always had good products in the portable space, but they have been pricey in the past," said Marshall Fernholz, network control manager at the American Medical Association in Chicago.

The moves signal IBM's rather belated attempt to enter the booming value market. Vendors such as Texas Instruments, Inc., NEC Corp. and Dell Computer Corp. have ratcheted up blistering sales in this segment, noted William Zinsmeister, an analyst at International Data Corp. in Framingham, Mass. "IBM continues to be a technology leader in portables, but at the end of the day, the volumes are shifting to the midrange and the entry level," he said. "That is where IBM is continuing to lose."

Meanwhile, several users have IPC prototypes. One is a 486-based system capable of some tasks, such as file saving, but most of the data resides on the host network. The second is a similar system based on a Pentium. The third is a handheld device.

Rather than "lobotomizing a machine'" just to access the World Wide Web, IBM may extend PC architectures and package them for specific applications, said Steve Kleynhans, an analyst at Meta Group, Inc. in Yorkdale, Ontario.

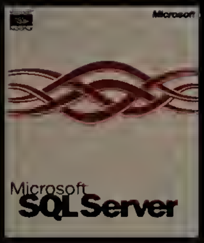


if you dance the waltz,
can you also shake the **watusi?**

if you play the accordion,
can you also wail on the **bass?**

if a database is designed for UNIX,®
can it scream on **Windows NT Server?**

	SQL Server	ORACLE	SYBASE
Best Performance and Scalability*	Yes	No	No
True Multithreaded Architecture	Yes	No	No
Integrated with all OS Services	Yes	No	No
OLE Automation	Yes	No	No
Visual Basic® Scripting	Yes	No	No
Native ODBC Interface	Yes	No	No
Mail-Based Queries and Alerts	Yes	No	No
Extended Stored Procedures	Yes	No	No
Rich Engine Cursors	Yes	No	No



Don't assume so. Microsoft® SQL Server™ delivers the best performance and scalability on Windows NT™ Server.* In fact, with its true multithreaded parallel architecture, Microsoft SQL Server delivers blistering transaction throughput while setting new records for price/performance.**

Truth be told, SQL Server is the only DBMS designed from the ground up for Microsoft Windows NT Server, so you can get the most out of your Windows®-based applications. It's no wonder that for Windows NT, more customers choose Microsoft SQL Server than any other DBMS.*** Get all of the details online at http://www.microsoft.com/SQL. Or call us at (800) 426-9400, Dept. A023, and we'll send you the information.

Microsoft
WHERE DO YOU WANT TO GO TODAY?™

*As of January 19, 1996, SQL Server has the highest transaction throughput of any Windows NT database, as published in the industry standard TPC® benchmarks. **Over the past three years, Microsoft SQL Server has set 11 new price/performance records in published TPC-C and TPC-B benchmark results. ***According to market research published by International Data Corp. ©1996 Microsoft Corporation. All rights reserved. Microsoft, Visual Basic and Windows are registered trademarks and BackOffice, the BackOffice logo, *Where do you want to go today?* and Windows NT are trademarks of Microsoft Corporation. TPC is a registered trademark of Transaction Processing Performance Council. UNIX is a registered trademark in the United States and other countries, licensed exclusively through X/Open Company, Ltd.

Big iron/Web link concerns users

By Craig Stedman and
Jaikumar Vijayan

IBM last week fleshed out its mainframe Internet features. But users said IBM still has to prove that turning System/390s into World Wide Web servers won't expose sensitive corporate data to the outside world.

IBM plans to release a secure version of its Internet Connection Server for MVS later this year, but the company didn't provide a specific shipment date. A second release of the OS/390 operating system, due in September, will also include tighter security for Web-based applications.

But several mainframe customers remain in a show-me mood. "We do not want any outside exposure to our customer data at all, period," said Michael Puldy, manager of resource management at Barnett Banks, Inc. in Jacksonville, Fla. "I don't think we're going to be on the leading edge of this."

Western Surety Co. also isn't sold on the idea of a mainframe-based Web server. "We want someday to take our business onto the Web, but we have to work out the security features," said Patrick Curren, a senior systems programmer at the Sioux Falls, S.D., company. The firm provides bonding indemnification services for businesses, contract workers and self-employed individuals.

Western Surety is looking at creating a corporate intranet, and its mainframe may have a role to play there as a database server, Curren said. But external Web server activities are more likely to be handled by a smaller system that could fetch data as needed from the System/390, he added.

IBM is trying to make it easier to link big iron to the Web. The first release of OS/390, which is scheduled to ship in late March, will include an Internet BonusPak that can be installed in a partition on an existing mainframe. This can be done without upgrading the whole machine to the new operating system, IBM officials said.

Several other mainframe-to-Internet links were promised for shipment this year (see box).

Network-centric computing is IBM's new mantra, and the computer giant is trying to cloak its products in Internet trappings.

System/390s have to be part of that effort, said Ira Machefsky, an analyst at Giga Information Group in Santa Clara, Calif. "But typically, you want to protect your mainframe behind a firewall," he added.

Last week's announcement also included IBM's three other hardware units. From an Internet perspective, the PC server group is most prominent. Its NetFinity systems management software, which is being renamed PC SystemView 4.0, lets network administrators use an Internet connection and a Web browser to manage LAN-connected PCs.

IBM also is bundling its OS/2 Warp Server-based Internet connection software with its PC Server 320 systems. That emulates similar moves made recently by Compaq Computer Corp. and Hewlett-Packard Co.

Web of iron

IBM will equip System/390s with the following Internet-related technologies:

- **Support for security protocols such as Secure Hypertext and Secure Sockets**
- **Integrated World Wide Web gateways to CICS and IMS transaction monitors**
- **Direct Web browser interface to CICS**
- **Ability for Web browsers to access mainframe data via MQSeries middleware**
- **System/390 support for Web gateway to DB2 database**

Notes eyes port to mainframe

Notes may have some big iron in its future.

IBM's mainframe division is embarking on a test port of Notes 4.0 to its OS/390 operating system. If enough performance can be wrung out of the code, a System/390 version of the groupware product should become available in 1997.

Demand for Notes on the mainframe is likely to be limited compared with the Unix or Windows NT versions, said David Marshak, an analyst at Patricia Seybold Group in Boston. But System/390 support could provide tight integration of Notes desktops with mainframe-based transaction data, he said.

Concerns that the mainframe plans could work against IBM's vow of platform neutrality for Notes "could be valid if we were creating something unique for the System/390. But that's not what we're doing," said Charles Lickel, vice president of System/390 business plans and systems architecture. Instead, the mainframe unit uses the standard Notes code base and ports it to the Unix-compliant OpenEdition MVS portion of OS/390, he said.

IBM said it also expects to put Notes on the AS/400 next year, but first it will support the software on a 486-based coprocessor due out in June.

— Craig Stedman

& **Unix server makers** promise to ratchet up performance. See page 41.

Kerberos code crack raises broader issues

By Gary H. Anthes

The cracking of Kerberos underscores the fact that no security product is 100% effective.

Kerberos is a system that uses encryption to protect users at financial institutions, universities and government agencies around the country. Two students at Purdue University recently found a way to break the encryption that is employed in a widely used version of the software.

"These things come up constantly," said John S. Swanteck, vice president of desktop administration at First Union Corp. in Charlotte, N.C. He said the bank isn't at risk because it uses a version of Kerberos from Transarc, Inc. that doesn't have the defect.

Nevertheless, Swanteck said fears about security mechanisms that don't work as intended have led First Union to drastically limit its connectivity to the Internet. "I get very nervous about it," he said.

"All security systems, crypto or otherwise, will likely have bugs or weaknesses," said Jeffrey Schiller, a developer of Kerberos and network manager at MIT. "The complexity of modern programming systems combined with human frailty more or less guarantees that."

The flaw in Kerberos results from the failure of the software to generate random numbers of sufficient length, which allows them to be easily guessed and then used to decipher users' secret "session keys." That would enable an intruder to gain access to a system without knowing a password.

"Fixing Version 4 should be a top priority for users," said Eugene Spafford, an associate professor of computer science and director at the Purdue laboratory where the defect was discovered. "Someone writing a very simple program in a matter of seconds can gain complete authority in a Kerberos Version 4 installation."

Glitches galore

The Kerberos defect is the latest in a series of glitches recently found — many by amateurs — in the systems users count on to ensure privacy and data integrity (see chart).

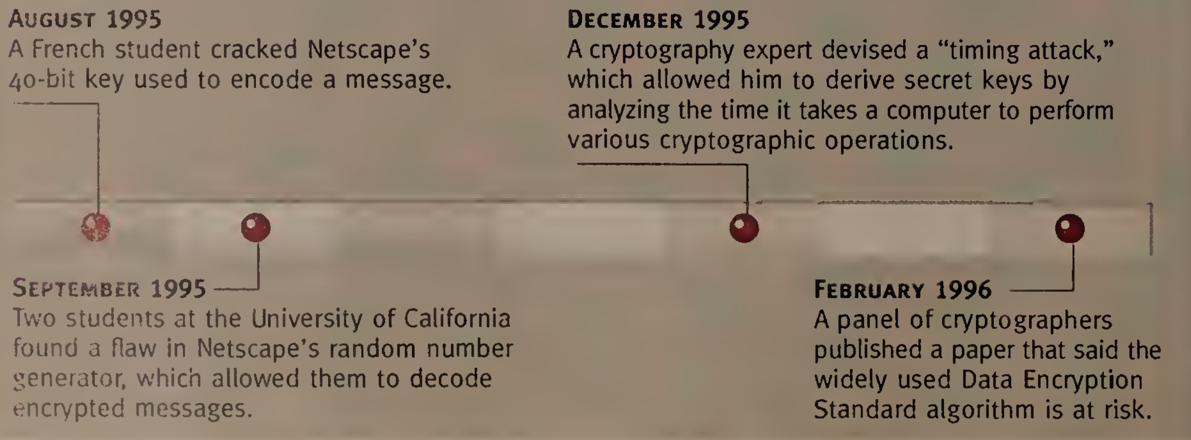
Schiller acknowledged that the security flaw in Kerberos Version 4 was known at MIT as early as 1989. "Frankly, we didn't plan on V4 being around as long as it has," he said. "Also, in 1989 we knew that the random number generator in V4 was bad; we just didn't appreciate how bad it was."

Experts agreed that the flaw is serious, but they cautioned users of cryptography against panic.

"We have to put security in a broader context," said Stephen T. Kent, chief scientist for security technology at BBN Corp. in Cambridge, Mass. "The way most break-ins occur in the Internet today is through flaws in operating systems. The use of cryptography isn't going to fix most of those flaws."

Weak links

The glitch found in the Kerberos system joins a growing list of shortcomings found recently in widely used encryption methods



AUGUST 1995
A French student cracked Netscape's 40-bit key used to encode a message.

SEPTEMBER 1995
Two students at the University of California found a flaw in Netscape's random number generator, which allowed them to decode encrypted messages.

DECEMBER 1995
A cryptography expert devised a "timing attack," which allowed him to derive secret keys by analyzing the time it takes a computer to perform various cryptographic operations.

FEBRUARY 1996
A panel of cryptographers published a paper that said the widely used Data Encryption Standard algorithm is at risk.

Corrections

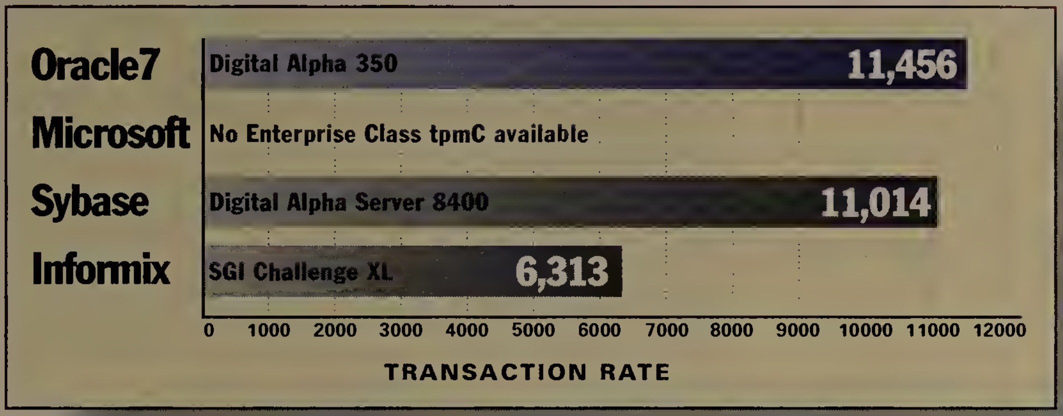
Due to a reporting error, "See me, feel me, touch me, heal me" [CW, Feb. 5] contained an incorrect price for Kurzweil Applied Intelligence, Inc.'s voice-recognition systems. Prices are $995 to $8,000.

* * *

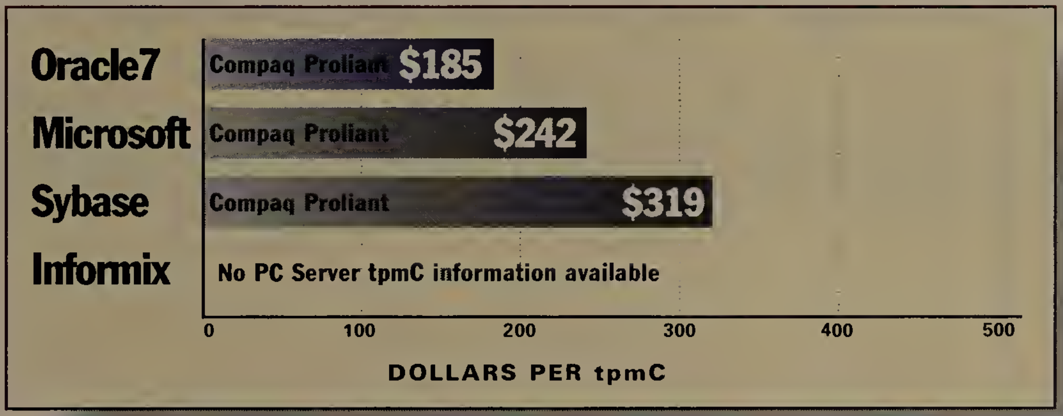
Due to an editing error, a chart on page 43 in the February issue of *Computerworld Client/Server Journal* should have stated that Cisco Systems, Inc.'s fiscal first-quarter revenue was $710.2 million. That figure was incorrectly cited as first-half revenue.

On Enterprise Class Systems or on PC Servers, Oracle Delivers.

Oracle7: Fastest Performance on Any Enterprise Class System.



Oracle7: Best Price/Performance on Any PC Server.



#1 Users' Choice

Database Server
DBMS MAGAZINE 1995 #1 READERS' CHOICE
Oracle7
Parallel Query DBMS
DBMS MAGAZINE 1995 #1 READERS' CHOICE
Oracle 7.1
Multimedia/ Document Management
DBMS MAGAZINE 1995 #1 READERS' CHOICE
Oracle Media Server
Data Replication
DBMS MAGAZINE 1995 #1 READERS' CHOICE
Oracle7 Replication Option
DBMS Connectivity
DBMS MAGAZINE 1995 #1 READERS' CHOICE
Oracle7 SQL Net
Software Support
SOFTWARE MAGAZINE SENTRY MARKET RESEARCH USER'S CHOICE
Oracle

Industry standard benchmarks prove Oracle7 is the fastest and most cost-effective database. Users award Oracle six gold database medals, and award no gold to Sybase and Informix databases. Think about it. Then call Oracle for the best software and support in the industry. Call 1-800-633-1071, ext. 8117.

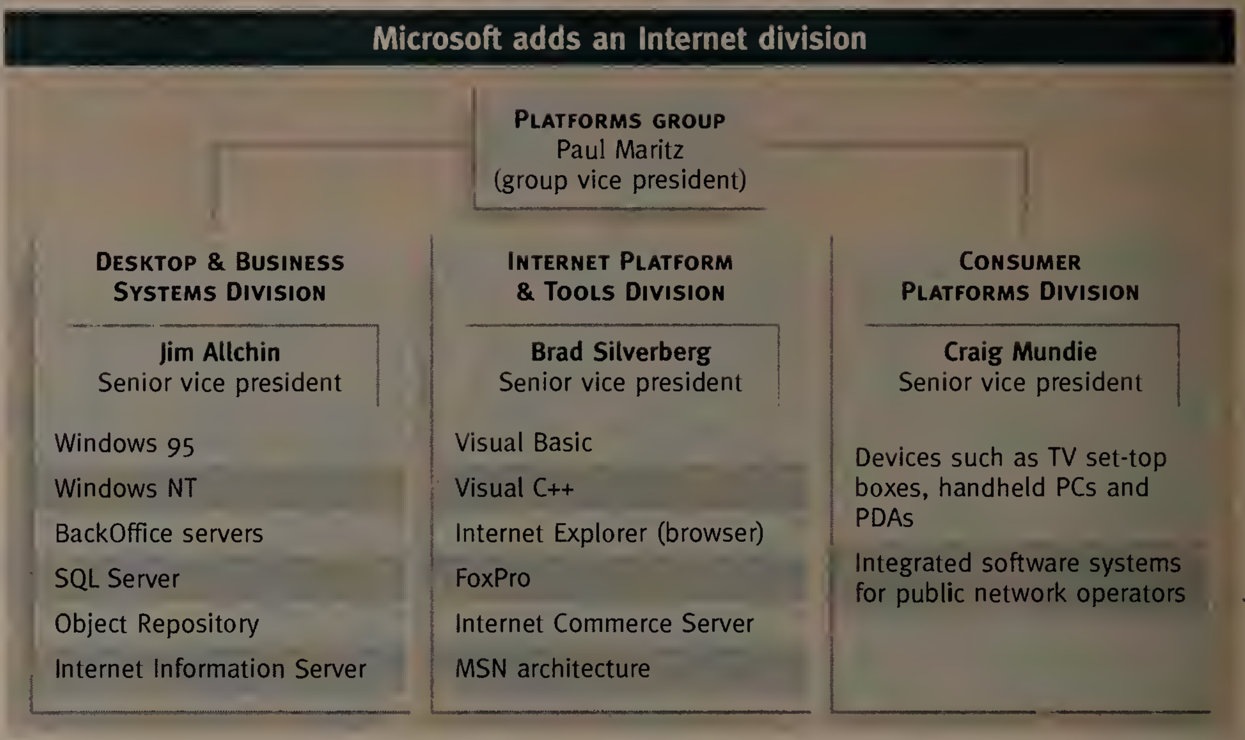
ORACLE®

Enabling the Information Age™

©1996 Oracle Corporation. Oracle7 and Oracle7.1 are registered trademarks of Oracle Corporation. All rights reserved. TPC results as of January 3, 1996. TPC is a trademark of the Transaction Processing Performance Council. All other company and product names referenced are trademarks of their respective owners. Or
Digital Alpha 350, 11,456 tpmC, $286/tpmC, Sybase Digital Alpha Server 8400, 11,014 tpmC, $222/tpmC; Informix SGI Challenge XL, 6,313 tpmC, $479/tpmC. Oracle7 Compaq Proliant, 3,516 tpmC, $185/tpmC, Microsoft Compaq Proliant, 2,454 tpmC, $242/tpmC, Sybase Compaq Proliant, 1,516 tpmC, $

Microsoft shuffles; Internet ends up at top of the deck

By Stuart J. Johnston


Microsoft adds an Internet division
PLATFORMS GROUP
Paul Maritz
(group vice president)
DESKTOP & BUSINESS SYSTEMS DIVISION
Jim Allchin
Senior vice president
Windows 95
Windows NT
BackOffice servers
SQL Server
Object Repository
Internet Information Server
INTERNET PLATFORM & TOOLS DIVISION
Brad Silverberg
Senior vice president
Visual Basic
Visual C++
Internet Explorer (browser)
FoxPro
Internet Commerce Server
MSN architecture
CONSUMER PLATFORMS DIVISION
Craig Mundie
Senior vice president
Devices such as TV set-top boxes, handheld PCs and PDAs
Integrated software systems for public network operators

Sometimes, even Bill Gates has to eat his own words.

Microsoft Corp.'s reorganization last week, which affected mainly product groups, included the creation of a separate division to focus on the Internet and related technologies (see chart).

Less than three months ago, company chairman Gates had disavowed any intent to create such a division.

At the time, he said the Internet would be integral to everything the company does in the future so having a division dedicated to it would be "like having an electricity division."

New line

The official company line is quite different now. "There are certain core technologies that we need to focus on that need to be released more quickly than traditional systems," said Paul Maritz, vice president of the Platforms Group at Microsoft.

For example, the company intends to ship multiple versions of its Explorer browser during the next year, he said. That's a far different pace from the one Microsoft usually takes when it enhances its operating systems.

Some observers expressed concern about the fate of Microsoft products. "I'm a little worried that in the quest to become leaders in the Internet, they'll lose leadership somewhere else, like BackOffice," said Bill Cornfield, president of the Windows Support Group, a New York consultancy.

But Cornfield said he thinks the move makes sense overall. Other industry watchers agreed.

"It makes me feel more comfortable about the Internet and about what Microsoft is doing," said Kelly Dwyer, director of global information technology at Braxton Associates in Boston, the strategy consulting unit of Deloitte & Touche.

"Forming an Internet group can only mean they'll be even more focused on getting good products out" for internal and external Web applications, said Charles Williford, an information systems specialist at Owens-Corning Fiberglas Corp. in Toledo, Ohio.

Among the changes that users and analysts found most promising was the consolidation of Windows 95 and Windows NT under the Desktop and Business Systems Division, which is headed by Senior Vice President Jim Allchin. This group also will handle BackOffice servers.

Some customers have complained that each product group at Microsoft pushed only the operating system for which it was responsible — Windows 95 or NT. At the same time, the company's overall message was that customers should deploy Windows 95 on machines with less memory and NT for higher-end applications.

"Given the mixed messages they've sent in the past, putting [Windows 95 and NT] under one umbrella is a good idea," said Dwight Davis, editor of "Windows Watcher," an industry newsletter in Redmond, Wash.

The responsibility for marketing and designing core functionality for Windows 95 will reside with Allchin's group, but the evolution of Windows 95's user interface belongs to the Internet division.

Officials said Windows interface design is there because of Microsoft's intent to incorporate Internet browser capabilities, including support for Java and Visual Basic Script, directly in to the user interface in the next release.

Senior Vice President Brad Silverberg, who previously led the Personal Systems Division where Windows 95 was developed, will head the Internet Platform and Tools Division.

Senior editor Kim S. Nash contributed to this report.

& **Banyan is also reorganizing** because of the Internet. See page 66.

News Shorts

Notebook kingpins slip

Three of the top four notebook vendors lost market share in the U.S. last year, according to **International Data Corp.** in Framingham, Mass. The research firm late last week released figures that showed that **IBM PC Co., Compaq Computer Corp.** and **Apple Computer, Inc.** all lost market share last year, and **Toshiba America Information Systems, Inc.** consolidated its hold on the No. 1 spot with 20% of the market. IBM's share slipped from 12.6% to 11.5%, although unit growth rose a modest 2%. Compaq went from 12.3% to 10.8%, and Apple dropped from 10.2% to 8.4%. Overall, the U.S market grew 12%, from 3.2 million units to 3.6 million.

On-line on the block

Owners of two of the three biggest on-line services said they will sell their businesses. **H & R Block, Inc.** in Kansas City plans to spin off its **CompuServe, Inc.** subsidiary beginning in April and ending by February 1997. And **Sears, Roebuck and Co.** ended months of speculation by announcing it will unload its share of **Prodigy Services Co.**, which the Chicago retailer jointly owns with IBM. H & R Block and Sears said they will drop their on-line interests to focus on their core businesses.

DCE moves forward

Computer Associates International, Inc. and **IBM's Transarc Corp.** subsidiary this week will announce that they will enable CA-Unicenter to manage networks that are based on the Open Software Foundation's Distributed Computing Environment (DCE) technology.

Architecture chief joins Kmart

Federated Department Stores, Inc.'s chief systems architect David Guzman will leave the company next month to join **Kmart Corp.** Kmart, which has delayed many information systems projects in recent months because of the company's financial hard times [CW, Feb. 5], has been without an architecture chief since Paul Gaffney left the company last fall.

Remote access options

Cascade Communications Corp. last week announced HyperPath, a package that will let telephone companies that use its wide-area network switches give users the option to outsource their remote access operations. The package will let users ditch remote access servers with Integrated Services Digital Network (ISDN) support, but analysts say it lacks support for analog dial-up links. HyperPath is available now, and Cascade said it is being evaluated by eight U.S. carriers.

ISSC does Denny's

Flagstar Companies, Inc. in Spartanburg, S.C., a restaurateur that owns Denny's, El Pollo Loco and other restaurants, outsourced its information systems operations to **Integrated Systems Solutions Corp.** (ISSC), a subsidiary of IBM. Flagstar officials said they expect net savings of more than $150 million under the 10-year, $323 million agreement.

Middleware melee

Rivals **Candle Corp.** and **Boole & Babbage, Inc.** are targeting systems management products at IBM's MQSeries middleware, which lets distributed systems communicate. Candle, in Santa Monica, Calif., is shipping a mainframe-based version of its Candle Command Center that can monitor MQSeries on multiple platforms. B&B, in San Jose, Calif., will announce this week that an MQSeries version of its MainView software will be ready in the fourth quarter.

IBM buys Smalltalk vendor

IBM agreed to acquire **Object Technology International, Inc.** (OTI), which produces the Envy/Developer Smalltalk development environment. OTI, which already licenses its technology for IBM's VisualAge Smalltalk system, will continue to operate as an independent subsidiary in Ottawa. Financial terms of the deal weren't disclosed.

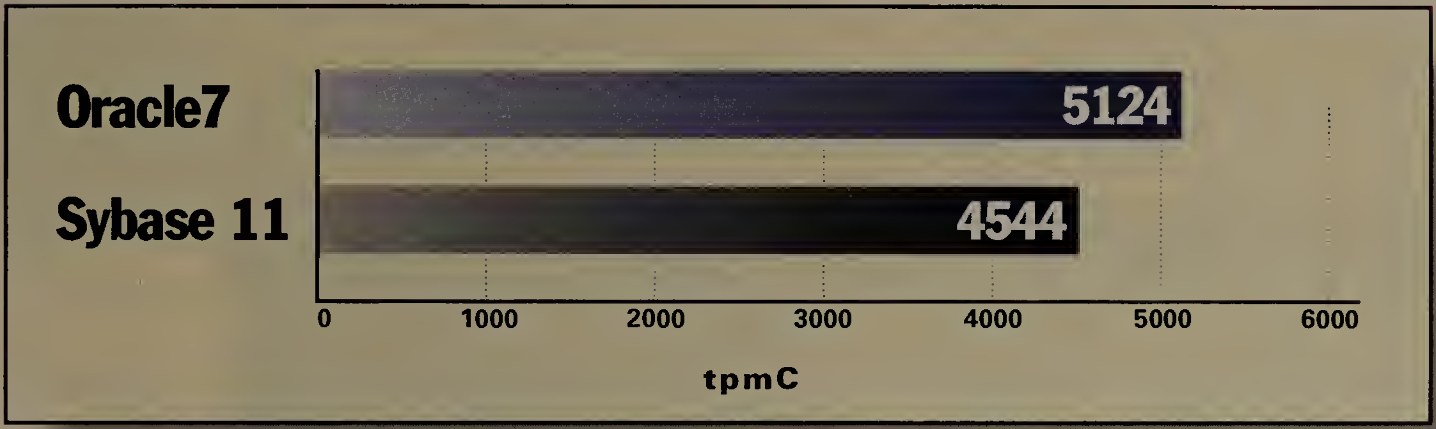
ISDN for NetWare

Novell, Inc. users soon will be able to dial in and out of NetWare LANs via ISDN lines because of a new hardware/software package developed by Novell and **Eicon Technology, Inc.** The offering is in beta testing and lets NetWare users dial in to Novell's NetWare Connect 2.0.

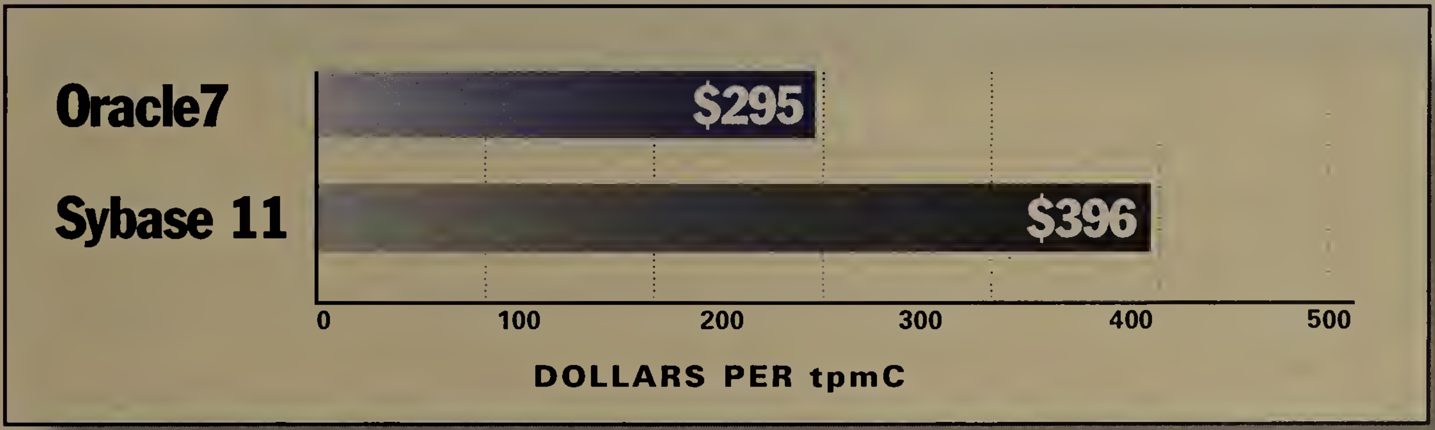
Oracle7 Outshines Sybase on Sun

The TPC-C benchmark is the industry standard test for measuring database On-Line Transaction Processing (OLTP) performance.

Fastest Transaction Rate on Sun



Best Price/Performance on Sun



When Oracle and Sybase were tested on a 16-cpu Sun Solaris system, Oracle clearly out-performed Sybase System 11 on price and performance. (It's almost not worth mentioning, but we also creamed Informix.) Just one more proof point that Oracle7 is faster, cheaper and better. Think about it. Then call Oracle, 1-800-633-1071, ext 8118.

ORACLE®
Enabling the Information Age™

©1996 Oracle Corporation. Oracle7 is a registered trademark of Oracle Corporation. All rights reserved. TPC results as of January 3, 1996. TPC is a trademark of the Transaction Processing Performance Council. All other company and product names are trademarks of their respective owners. Oracle Sun SPARCcenter 2000E, $295/tpmC, Sybase Sun SPARCcenter 2000E, $396 tpmC

Oracle begins Universal Server rollout

Family of servers, tools will manage multiple data types from single app

By Dan Richman

Oracle Corp. today will begin shipping most pieces of its Oracle Universal Server, its framework for the next several years.

Universal Server is a family of servers and tools that will manage multiple data types beyond character and numeric data. Among these are video, images, spatial information and text. It does this from within a single development and administrative environment and also from within a single application.

Universal Server reflects a trend within the database industry to expand the capabilities of relational database management systems. All of Oracle's rivals have announced similar plans.

Oracle users said Universal Server should help their businesses.

"We believe it means we won't have to write as many [application programming interfaces] to make different Oracle servers work together," said Henry Kucera, head of data administration at the British Columbia Ministry of Environment, Lands and Parks. "It will also simplify licensing and ensure that all the pieces are available on all the platforms we want to run on."

Another user, Matt Sherek, database administrator at catalog retailer Fingerhut Cos. in Minnetonka, Minn., said Universal Server "might make it possible for customers to use the Internet to call in, see videos of products in use, then place orders — all on the same hardware and software."

The Redwood Shores, Calif., company will modify Universal Server to accommodate the long-promised Oracle8, an object/relational database scheduled to ship by mid-1997.

Universal Server includes either the workgroup or the enterprise edition of Version 7.3 of the Oracle7 RDBMS, plus any or all of five additional servers: the ConText text-search server, a video server, a spatial-data server, an on-line analytical processing server and a messaging server. It also includes Oracle's Advanced Network Option security software and the Enterprise Manager management and monitoring software.

Universal Server "might make it possible for customers to use the Internet to call in, see videos of products in use, then place orders — all on the same hardware and software."

— Matt Sherek, database administrator, Fingerhut

Release of the components will be staggered over the next four months.

Free upgrades

Current licensees of Oracle7 will be upgraded automatically, at no charge, to Version 7.3. Included free with 7.3 will be WebServer 1.0, which allows Oracle data to run on the Internet.

The components within Universal Server will sell for 15% to 30% of the cost of Oracle7 Version 7.3, but that product's pricing is unclear.

One spokesman said the Oracle7 workgroup edition starts at $1,500 and the enterprise edition starts at $16,000 in the U.S. But other spokesmen gave a more complex pricing scheme. They said new buyers who can count their users will pay $295 per concurrent user for the workgroup server and $1,995 for the enterprise server. Sites that can't count users, such as those that open their databases to Internet visitors, will pay $5,900 per processor for the workgroup server and $63,840 per processor for the enterprise server.

With a **Brixton SNA Server**

the road to your internet
is **wide open.**

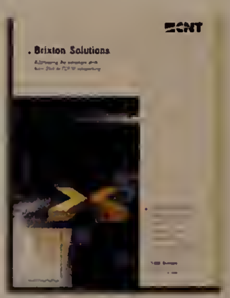
As TCP/IP networking has grown, so have your SNA access problems. More users than ever need access to your mainframe data. And more than ever, you need a central solution that lets you manage all that traffic.

BRIXTON
OPEN
SOLUTIONS

What's the answer? The Brixton SNA Server from CNT Corporation. It runs on a wide range of open platforms, so you can use it anywhere. It gives you and your users one look and feel throughout your enterprise, so it's easy to implement.

Best of all, the Brixton SNA Server's unique distributed architecture provides the robust performance you need in an enterprise server. A fault-tolerant design with load balancing ensures performance and availability even with thousands of users. It includes SNMP, security, audit trails, charge-back and more. Plus a graphical management interface that makes it easy to add, delete and modify SNA resources.

The Brixton SNA Server gives you everything you've been looking for in SNA access. It's already proven in dozens of Fortune 100 companies. Call today for your free "Brixton Solutions Guide." And shift your internet access into high gear.



CNT™

1-800-BRIXTON
1-800-274-9866

UK +44 1753 792400 • France +33 1 41 30 12 12 • Germany 49 6074/8277-0 • http://www.cnt.com

Micro Focus Revolve®

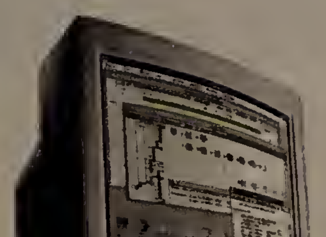
What would you do if you could make real-time changes and watch their effects at the same time?

Significantly reduce system maintenance and enhancement costs with Revolve's ability to perform system-wide impact analysis and documentation. Micro Focus Revolve is a powerful development and analysis tool that allows you to graphically view any application and the impact of any changes to it.

Unlike less scaleable products, Revolve quickly and clearly documents the relationships between source code, data, screens, JCL and other aspects of very large systems to help you accurately estimate the cost and timing of projects. The impact analysis tool then identifies all of the locations and effects of proposed changes, such as updating the date calculation to go beyond the year 1999.

Revolve seamlessly integrates with Micro Focus COBOL or can be used as a stand alone development, testing and analysis environment. In either case it lets you manage your system and see exactly how far your changes will reach.

See for yourself. Contact Micro Focus at 800 MF COBOL Ext. 1203 and ask for your copy of the Micro Focus CD. On it, you'll find descriptions and interactive demonstrations of Micro Focus Development Tools.



"A better way of programming."™ MICRO FOCUS®

Micro Focus and COBOL Workbench are registered trademarks of Micro Focus Ltd. A better way of programming is a trademark of Micro Focus Ltd Revolve is a registered trademark of Burl Software.

HP finds high security 'net niche

Virtual Vault a secure but pricey firewall

By Craig Stedman

Hewlett-Packard Co. has acquired technology that will let customers build military-class security in to their World Wide Web servers.

This latest effort takes HP beyond the me-too category and into a high-end security realm that rival vendors haven't staked out, analysts said.

The software was developed by SecureWare, Inc. in Atlanta. It is supposed to prevent unauthorized users from breaking in to customer accounts and other data stored on Web servers that process transactions via the Internet.

Locked away

HP's Virtual Vault puts a secure Web gateway on top of a trusted operating system that doesn't give root users any control over the server. The technology blocks a common method that is used to take over systems.

The increased protection makes it feasible to install a Web server outside of a corporate firewall so that external users can easily access business services, according to Virtual Vault's first user.

"It restricts people to only communicating with our servers in the ways that we dictate they can," said Michael Karlin, president of Security First Network Bank, an on-line bank in Pineville, Ky.

Customer data is protected in an internal partition that can't be penetrated by outside users or the bank's own employees, Karlin said.

Audit logs have captured some suspicious activity, but there have been no security problems since the bank began operating in October, he said. "People have come knocking, but they haven't gotten in."

For now, Virtual Vault is complex and requires deep pockets. HP officials said the software needs custom engineering and consulting services that can push the tab to more than $100,000; that compares with a cost of about $20,000 for a high-end firewall. HP said it hopes to bring the price down into the firewall range within the next year by creating a more packaged version.

Despite the high cost, analysts said the acquisition sets HP apart from its competitors, something that the introduction of its Web server in late January failed to do [CW, Jan. 29].

Spicing it up

"HP was late to the Internet game and had a very vanilla story before, and it wasn't even a particularly flavorful vanilla," said Jim Greene, an analyst at Summit Strategies, Inc. in Boston. "This gives them something to stand on that's more credible."

The software runs only on HP's hardware for now, but it will be ported to other Unix platforms and Windows NT this year, said Jan Silverman, director of Internet solutions at HP.

Virtual Vault also will be integrated with smart-card user authorization technology and HP's OpenView and OpenMail products, Silverman said.

Internet security tools

Secure in their ways

Three approaches to Internet security

Virtual Vault

The Web server is secured by an operating system with B1-class security and a Web gateway that separates users from corporate databases. Root users have no power of control, and system administrators are prevented from gaining access to data.

Firewalls

A common first line of defense that functions as a filter, similar to a security guard in the lobby of a building.

Data encryption

Data traveling across the Internet can be encrypted to prevent hackers from deciphering the contents.

Source: Illuminata, Inc., Nashua, N.H.

Netscape gives nod to VMS users

Web software, suite slated to hit the streets in June

By Michael Goldberg

The World Wide Web is about to open wider for OpenVMS users.

Netscape Communications Corp. said it will port its server software to OpenVMS, Digital Equipment Corp.'s proprietary operating system for VAX and Alpha servers, by midyear.

Users at the December meeting of the Digital Equipment Computer Users Society (DECUS) and on the Internet's OpenVMS user group have been clamoring for what they consider to be first-tier Internet software products.

Those users contacted by *Computerworld* last week hailed the pending arrival of Netscape Web server packages.

Anticipation

"VMS users are very much sitting on the edge of their seats for this" in the belief that Netscape is a de facto industry standard for Web servers, said Kenneth Fairfield, a systems programmer at the Stanford Linear Accelerator Center in Stanford, Calif.

Netscape expects OpenVMS versions of its software for Web applications to be available by the end of June. Digital plans to make an OpenVMS Internet product suite available in June or July. The suite would include Netscape's Communications and Commerce Server and other software (see chart).

Susan Denham, OpenVMS Internet product manager at Digital, said the suite would cost between $50 and $100, plus licensing fees from software vendors. The Internet suite will require that computers run Version 6.1 or higher of OpenVMS.

"It's a networkcentric world right now, and ... we need to have these types of tools," said Margaret H. Knox, associate director at the Computation Center at the University of Texas at Austin.

Terry Shannon, an industry analyst and editor of the "Shannon Knows DEC" newsletter in Ashland, Mass., said porting Netscape server software to OpenVMS is another example of Digital's work "to extend the life" of the operating system.

Digital last year introduced a program to give OpenVMS users access to applications that run on Windows NT.

"We've been waiting for [Netscape on OpenVMS]. We have it running on Sun and HP and [Macintoshes] and PCs now," said Ed James, manager of computer and communications services at Lockheed Martin Corp.'s Laboratories in Baltimore.

James said the laboratory is a heavy user of internal Web pages and would like to outfit its OpenVMS servers with Netscape software.

Underground access

Digital plans to offer a new version of its OpenVMS Internet Product Suite every few months.

The second version, due in early 1997, will include Digital's tunneling technology, which allows remote users to gain access through a corporate firewall.

Unix and NT

Netscape makes its server software available on Unix systems by Sun Microsystems, Digital, Hewlett-Packard, IBM and Silicon Graphics and on servers that run Windows NT.

Digital's OpenVMS Internet Product Suite on CD-ROM will come bundled with the following software products:

- Netscape Navigator and Spyglass Enhanced Mosaic client software
- Netscape Communications Server, Netscape Commerce Server and Purveyor Server
- Digital Firewall for OpenVMS
- Tools for creating World Wide Web pages with graphics, checking HTML syntax and converting text to HTML

& **Support and NT server** troubles plague Netscape. See page 1.

Microsoft backs up BackOffice

By Frank Hayes

Can BackOffice make it as a full-fledged enterprise system? Hoping to give users the tools they will need to make it so, Microsoft Corp. next week will announce that it has signed Synon, Inc. to provide an application generator for its BackOffice suite.

Synon already has ported its AS/400-based Obsydian development system to Windows NT to several versions of Unix. But under the deal, a new version of Obsydian will generate server applications that tightly integrate with BackOffice's security, management and networking systems.

That release, which will be tested at sites in early May, will make Windows NT much more credible as a replacement for traditional midrange systems, users said.

Just the ticket

"We're totally an AS/400 house, and we want to extend the life of our legacy systems while at the same time [move] into the Windows environment and a client/server architecture," said Wynne Powell, senior vice president and chief operating officer at London Drugs Ltd. in Richmond, B.C. "This gives us a real infrastructure to work in."

Microsoft still will provide NT's C++ development tools, officials at both firms said. But Synon's Obsydian will offer users a system in which developers can define business objects and application designs and generate the application code automatically.

The system will cost $8,750. It will have a set of more than 300 prebuilt business objects, a team repository, graphical modeler and user-interface designer.

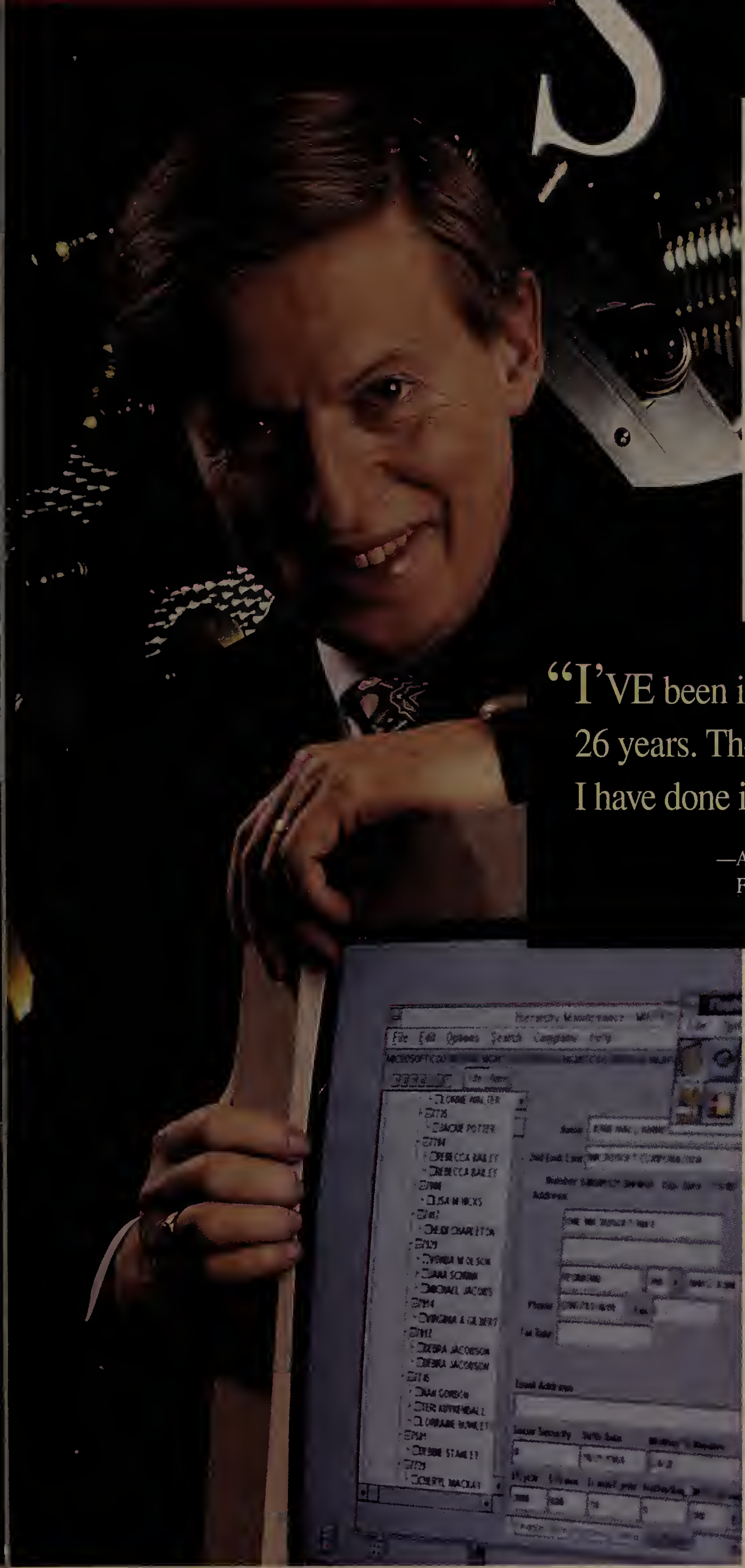
Until recently, many users have viewed NT as a network or file server, not a replacement for the minicomputer.

But BackOffice gives NT users a collection of services that are common in mainframes and proprietary minicomputers, said David Guzman, director of information technology architecture at Federated Department Stores, Inc. in Cincinnati. He cited elements such as a standard database, networking and utilities that have been left out of client/server operating systems such as Unix.

& **Big system backup** moves to PC servers. See page 41.

NEW Delphi
Client/Server Suite 2.0

Success you can bank on.



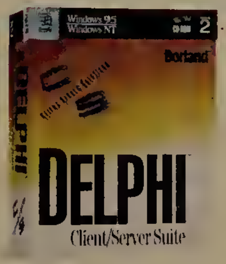
NEW Delphi Client/Server Suite 2.0—Solutions for Success. When the First National Bank (FNB) of Chicago needed a client/server application to provide their purchasing card customers with immediate access to their accounts, it turned to Borland's Delphi™ for the solution. Delphi Client/Server Suite met all of their criteria for creating the FirstWindow 2000 Purchasing Card application. This application allowed customers access to a huge organizational hierarchy of departments and regional offices in a very graphical, drag-and-drop fashion. This experience with Delphi enabled two developers to create the powerful Information Manager application in just three months, less than half the budgeted time. Based on this success, FNB has adopted Delphi as the standard for all of the FirstWindow 2000 applications across the enterprise.

Graceful scaling across databases. The beauty of Borland's client/server tools is that they allow you to build applications that meet changing business requirements. With the built-in SQL Links capabilities in Delphi, users can readily access all of the most popular SQL databases, including Oracle, Sybase, Informix, Microsoft SQL Server, and InterBase.® FNB built their applications on the InterBase database and found it to be the easiest SQL server to install, use, and maintain.

> "I'VE been in this business for 26 years. The smartest thing I have done is choose Delphi."
>
> —Art Hill, Vice President of IS,
> First National Bank of Chicago

Fast application development and ease of use. Delphi Client/Server Suite is the only tool to combine the performance of a native-code compiler, the productivity of visual component-based design, and the flexibility of scalable database tools. It provides all the tools for professional client/server development including a Data Dictionary, Object Repository, SQL Monitor, Visual Form Inheritance, integrated Version Control, and more. You don't have to choose between productivity and performance, or power and flexibility anymore.

Gain the competitive advantage. Delphi gives the First National Bank of Chicago and its clients an unfair advantage. But, that's often what it takes to win the race.



As Art Hill says, "*It is rare in our industry when one product is so much better than all of its competitors that you must have it. Delphi Client/Server Suite 2.0 is that good.*"

For more information or an evaluation copy of the New Delphi Client/Server Suite

call 1-800-884-1117

Come visit us at the Borland Developers Conference
July 28–31 in Anaheim, CA. To register call 1-800-350-4244;
outside U.S. and Canada, call (805) 495-7800, ext. 239.

Canada: 1-800-461-3327 • CompuServe: GO BORLAND
Internet: http://www.borland.com

Learn how Delphi can help you overcome the obstacles to client/server success.
Register for a FREE seminar.

Call 1-800-395-6620

Borland
Making Development Easier

Programmer's Shop	Programmer's Paradise	Stream	Softmart	Software Spectrum
1-800-421-8006	1-800-445-7899	1-800-275-1334	1-800-328-1319	1-800-787-1166

Copyright © 1996 Borland International, Inc. All rights reserved. All Borland product names are trademarks of Borland International, Inc. BI 9067

Switch vendors add 'net wares

By Bob Wallace

Forget the Nestea Plunge. Dive into the Internet instead.

That's what Bay Networks, UB Networks and TGV Software did last week with products that let users maximize use of the Internet.

The moves are further evidence of an emerging trend whereby traditional internetworking vendors are looking to new profit horizons by diversifying their longtime product mix of switches, hubs and routers [CW, Feb. 19].

Bay Networks, Inc. last week moved to acquire Internet access server vendor Performance Technology, Inc. for $13 million in cash. UB Networks, Inc. announced plans to embed Java capabilities in its EMPower Management subsystem, which can be used to manage UB switches and hubs (see chart).

And TGV Software, Inc. detailed sorely needed Internet server software.

Bay's acquisition of Performance Technology will give it the Instant Internet package, which lets medium-size and small sites link LANs to the Internet without requiring each Novell, Inc. IPX client to run an IP stack.

The Instant Internet server connects users of Novell's NetWare and Microsoft Corp.'s Windows 95 and Windows NT to the Internet without requiring changes to LAN clients or servers.

One longtime Bay user was pleased to see the vendor getting into the Internet products market. Bernie McGrory, a network analyst at the Lahey Clinic/Dartmouth Hitchcock Medical Center in Burlington, Mass., said Bay's move "could mean that we'll be able to buy less expensive devices for our Internet connections."

For its part, TGV announced new software packages that enable users to build flexible and scalable intranets, or internal company internets. The software runs on Digital Equipment Corp.'s OpenVMS, Sun Microsystems, Inc.'s Solaris and the Windows 95 and NT platforms.

The new MultiNet Information Server comprises two components: Cheetah Web Server and WebClusters. Cheetah Web Server provides a means to centrally and remotely manage a series of information services using a graphical user interface.

The dearth of versatile commercial World Wide Web servers had forced one user to take a long look at public domain offerings. Then TGV came along with Cheetah Web Server.

"I feel much more comfortable with a vendor-backed server rather than going the other way and being unsure of service and support," said Mike White, a senior systems programmer at Ball State University in Muncie, Ind., a Cheetah Web Server beta site. "The TGV system is also much easier to install and configure, which are big pluses."

The WebClusters component performs load balancing and replication of content among multiple Web servers. Replication of content decreases the time involved in managing and uploading content across multiple Web servers.

TGV's second new software package is called MultiNet Enterprise Server. It provides network services needed to build and maintain TCP/IP networks across multiple platforms.

Taking the Internet plunge

Vendor	Product	Price	Availability
TGV Software	Cheetah Web Server	Starts at $295	Q1 1996
	MultiNet Information Server	Starts at $945	Q2 1996
	MultiNet Enterprise Server	Not released	Q2 1996
UB Networks	EMPower application with Internet access	Not released	This summer
	EMPower code with embedded Java support/embedded applets	Not released	Second half 1996
	Third-party Java-based EMPower applications	Not released	1997

IP routers debut at half the going rate

By Stewart Deck

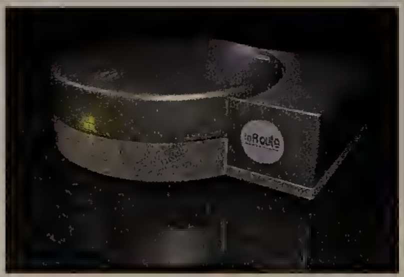
Sourcecom Corp. has dropped the price bar in the Internet access router limbo contest. The Santa Clarita, Calif., company has come out with InRoute, a line of Ethernet IP routers that offer high-speed Internet access and support Novell, Inc.'s IPX protocol at about half the going price.

Analysts said they expect competitors such as Cisco Systems, Inc. to bring down the price of their lowest-end routers, but matching Sourcecom's $500 street price will be difficult.

"Sourcecom has carved out a niche for themselves and has taken a big lead in the inexpensive router market," said Frank Dzubeck, an analyst at Communications Network Architects, Inc. in Washington.

The downside is that the Sourcecom routers don't offer some of the features of more expensive routers. The stripped-down routers lack data compression and Integrated Services Digital Network (ISDN) support.

Stripped-down works for some users. InRoute "was just what we were looking for," said Tanver Anas, president of Security Systems Integration and Consulting, Inc. in Glendale, Calif. "These are flexible and full-functioning routers with bridging that supports high speeds. That, combined with the price, was very attractive to us." Security Systems provides real-time stock market data to brokerages. The firm lets brokers dial in to its network for market information and needed a backbone router to handle the job.



Sourcecom's InRoute *is a stripped-down router*

Cheyenne, PSI combine utilities for NetWare

By Laura DiDio

In a move that could save time and energy for network administrators, Cheyenne Software, Inc. and Preferred Systems, Inc. (PSI) are combining their respective migration and management utilities into a single software package for Novell, Inc.'s NetWare.

Cheyenne in Roslyn, N.Y., makes the ARCserve network backup software package. PSI in West Haven, Conn., markets DS Standard, a directory services management and configuration utility. DS Standard lets administrators create Novell's NetWare Directory Services (NDS) trees off-line and speeds migration from NetWare 3.x to 4.1.

Network management

The companies said they will deliver ARCserve 6 for NetWare with DS Standard NDS Manager Version 2.0 later this year in a two-phase rollout.

In the first stage, which starts immediately, a 45-day promotional copy of DS Standard NDS Manager will be included on the ARCserve 6 for NetWare CD-ROM. The 45-day trial can be extended by calling PSI directly, said Jack Serfass, the company's president. The second phase — delivery of the two utilities on the same CD-ROM software package — will begin in the fourth quarter.

Users and systems integrators said having ARCserve and DS Standard in the same software package would save time, conserve human resources and ensure that network administrators wouldn't duplicate efforts.

Kevin Puent, a senior network analyst at Nortel Communications Systems in San Ramon, Calif., said a combined software package would have immediate benefits in his environment. It would allow Puent to view and build NetWare 3.x bindery databases, migrate them directly into the NetWare 4.1 NDS tree and back up all the information simultaneously.

"This is an incredibly big timesaver — up to two weeks' worth of work in new network installations or migrations to NetWare 4.1," Puent said. "I could view all my bindery data and migrate it directly into the NDS tree without having to rebuild the tree from scratch."

Pricing for ARCserve 6 for NetWare and DS Standard NDS Manager Version 2.0 hasn't been set.

HP boosts internetworking tool kit

By Patrick Dryden

Hewlett-Packard Co. this week will offer network management software designed to ease the monitoring, troubleshooting and upgrading of its internetworking gear.

The Interconnect Manager automatically discovers HP's hubs, switches, bridges and probes and displays them graphically. Administrators can pick devices from the map for remote examination and configuration.

Supported devices include HP's hubs for 100M bit/sec. connections via the 100VG-AnyLAN topology. That's a relief to team leader Bryan Reese, who plans high-speed workgroups at 10 field offices of the U.S. Department of the Treasury's Office of the Inspector General.

"We were concerned about finding tools to monitor the VG LANs at those sites," Reese said. "We must manage them all from Washington to save time and money."

Two other features help administrators prepare for upgrades such as switch placement.

A traffic monitor displays simple gauges for a quick check of key network performance statistics. And by tracking the busiest pairs of nodes, administrators learn where to add switched connections to optimize overall performance.

The product costs $499.

& **The CW Guide** to RAID storage. See page 89.

Visual tool eases Java development

CONTINUED FROM PAGE 1

thing."

Java lets programmers create Internet applications that will run unchanged on Windows, Unix and other platforms. Developers can build small applets that can be downloaded and run as part of a World Wide Web page or as larger stand-alone applications.

But until now, developers have had to write virtually every line of Java code themselves. JFactory, which runs on Microsoft Corp.'s Windows 95, Windows NT and Sun's Solaris, lets developers use a mouse to drag and drop windows, menus, button and other user interface elements. Common features of Java Web page applets, such as animations, also can be created without writing code.

Who runs Java?

Web browsers that can run Java applets support these platforms today . . .

- Windows 95
- Windows NT
- Solaris

. . . and are in beta testing for:

- Mac OS
- HP-UX

The development system, with a single mouse click, generates a working Java application.

"The Java code JFactory produces is immediately usable on all the other released Java platforms. It just works without modification on a SPARC, for example," Rhoads said.

Some application logic requires programmers to write some Java code — for error handling and reading data from files, for example. JFactory preserves the added code even if the application's user interface is changed and the application is regenerated.

More in May

JFactory comes with about a dozen Java user interface elements, but developers can build and save their own graphical elements. Ordinary libraries of Java code also can be used with the system. Rogue Wave, which is based in Corvallis, Ore., has promised to release more Java offerings by early May.

JFactory is based on Rogue Wave's Zapp Factory C++ development system, which runs on a variety of Unix systems. New versions of JFactory will ship as soon as Java is fully supported on additional operating systems. A version for Hewlett-Packard Co.'s HP-UX will be available soon, the company said.

Though it is a big improvement over current Java development tools, JFactory falls a little short of the features of popular visual development systems such as Microsoft's Visual Basic.

"You can't customize the layout manager or specify look-preference policies," Yalovitser said. "But this is the first tool that will elevate a Java coder from being a hacker to being an interface designer."

Still, JFactory's rapid development approach is no cure-all, especially for larger Java projects. "It certainly sounds valuable, but it won't replace careful object-oriented design, which is the most critical part of a Java project," said John Gawkowski, a Java application architect at R. R. Donnelley & Sons Co. in Chicago.

"It's absolutely not a panacea, but it's going to make a lot of people able to program with the language that they may not be able to [use] today," said Rick Brennan, manager of Web services at National Semiconductor Corp. in Santa Clara, Calif.

Latte to go

Borland International, Inc. is working on a Java visual development environment, too. The Scotts Valley, Calif.-based company plans to roll out its Latte development system in the second quarter.

COMPUTERWORLD'S
TechnoTrivia

Play COMPUTERWORLD's TechnoTrivia Game and Win Big Prizes

A **Bahamas cruise** for 2 with a chance to win **$5,000** onboard the ship...A Sony CD-ROM **Discman**™ PRD-150 Player...A Sony CCD-PC1 **Computer Video Camera**...plus weekly prizes!

HERE ARE A FEW OF OUR WEEKLY WINNERS TO DATE:

G. Turner/DP Manager
Phoenix Metals, Inc.

K. DeMarco/Systems Manager
Stonebridge Financial

B.Wright/Assistant Professor
Columbus College

B. Wood/Systems Manager
Nucor Bearing Products

Sony Magic Link™ Personal Communicator
1 weekly prize winner

Dunkin' Donuts TechnoTrivia Tuesday Coffee Break
5 weekly prize winners
Dunkin' Donuts gift certificates (or alternative coffee shop) for 20 people that includes coffee and donuts.

R. Lute/MIS Supervisor
KMS Research, Inc.

B. Cohen/Director of Technology Svs.
Tower School

J. Brier/Director of Information Svs.
Goodwill Industries of Pittsburgh

S. Gallup/Systems Developer
Kmart Corporation

R. Higgins/Sr. Technical Fellow
Federal Express Co.

J. Dissly/Development Support Mgr.
Trane Co.

For details on how to play Computerworld's TechnoTrivia, go to page 28 in this issue.

DG keeps afloat in troubled waters

Posts two profitable quarters, unveils Intel-based servers

By Neal Weinberg

The good ship Data General Corp., which has been all but dead in the water for the better part of a decade, is starting to make headway.

In the past several months, the Westboro, Mass.-based company quelled a user uprising by introducing a line of Intel Corp.-based servers. The company also racked up two straight profitable quarters and saw its stock nearly triple in value.

By midyear, DG plans to ship servers sporting four-processor, Pentium Pro motherboards from Intel. And it will use a technique called nonuniform memory access architecture to link multiple motherboards in a symmetrical multiprocessing server that will ship by year's end.

"I think they've weathered the storm — a long, frightening storm," said Tim Boyer, data processing manager at Denmon Tire Corp. in Cleveland.

In fact, Boyer just ordered an Intel-based Aviion server to replace his Eclipse MV. A DG customer since 1979, Boyer said he almost defected to a new vendor because he wanted to be on a Pentium-based system. "The introduction of the Intel machines has made a tremendous difference," Boyer said.

DG has done a good job managing the transition from servers running the Motorola, Inc. 88000 series chip, which the company will continue to sell, to the new Intel models, said Bob Sakakeeny, an analyst at Aberdeen Group, Inc. in Boston.

In the latest quarter, Aviion sales grew 8%, and the Intel-based Aviions won 15% of total server sales. The other growth area for DG is its Clariion line of RAID storage systems. Through OEM channels, DG has boosted Clariion sales in the past four quarters from $33 million to $99 million.

Steven Milunovich, an analyst at Morgan Stanley & Co. in New York, predicts DG will show a 25% increase in revenue this fiscal year, driven by a 37% surge in Clariion sales. Milunovich estimates earnings per share of 85 cents.

That's a dramatic turnaround for a company that has lost money in nine of the past 10 years and has less revenue today than it had in 1985.

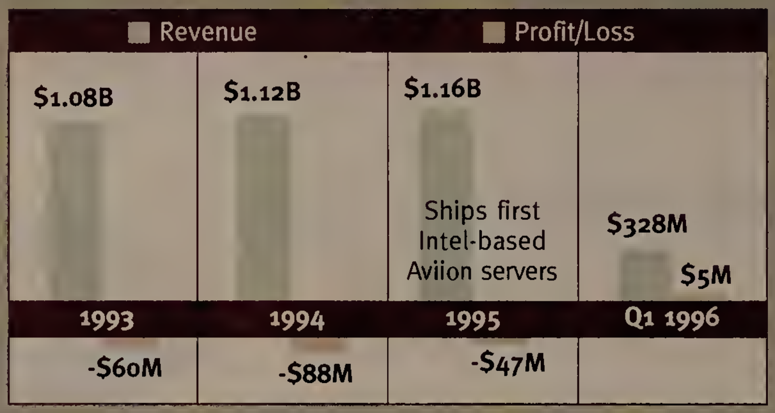
Change of heart

Users have been "really upbeat" of late, said Steve Pounds, controller at Security Forces, Inc. in Charlotte, N.C., and president of the DG user group. Last spring, users were upset about being stranded on the Motorola chip, which wasn't attracting new applications from independent software vendors.

But DG announced plans to move to Intel in June and introduced the new servers in October. The company's game plan going into next year is to sell standards-based servers — bundled with software and service — and to sell chips, boards and servers to other computer vendors, which is a new growth area, said Stephen K. Smith, an analyst at PaineWebber, Inc. in New York.

U-turn

Data General hopes it is on an upward climb



Oil group hopes ATM yields rich strike

By Neal Weinberg

A petroleum consortium today will use the high bandwidth of Asynchronous Transfer Mode (ATM) to launch a faster way of getting crucial oil exploration data back to the people who need it most.

The ATM Research and Industrial Enterprise Study (ARIES) project is trying a new method of transmitting seismic data gathered from ships at sea. In a demonstration, ARIES will transmit data from a ship in the Gulf of Mexico to a satellite and then onto a land-based ATM network.

"This is the big one," said Ray Cline, director of information systems at the American Petroleum Institute in Washington. There have been other demonstrations using this technology but never with live data [CW, Oct. 23, 1995].

Seeking time savings

Cline said the ARIES project is moving toward creating a permanent ATM network that will significantly slash the time it takes to pick spots for oil drilling activities.

Under the current system, an industry subcontractor, such as Schlumberger/Geco-Prakla, gathers 60G bytes of seismic data daily from one ship roaming the ocean on a six-month voyage.

When the ship returns to shore, as many as 100 magnetic tapes are hand-delivered to scientists who analyze the data. If more readings are needed, the ship has already moved on, and it could take several more months for a ship to be rented and sent to the same spot, said Rick Morneau, staff geophysicist at Chevron Petroleum Technologies Co. in Houston.

By using ATM to send data directly to onshore scientists, decisions on where to redirect the ship can be made that same day, Morneau said. This will shave several months off the process.

In addition, the land-based portion of the ATM network will allow scientists from the various oil companies to gain access to the central repository at Schlumberger/Geco-Prakla's headquarters in Houston.

"The way to do that now is to fly people there and sit them down," Morneau said. "ATM switching allows them to tap in to companies all over the place."

Facts about ARIES

Points on the network:

- Geco Diamond ship in the Gulf of Mexico (pictured)
- Minnesota Supercomputer Center, Minneapolis
- Jet Propulsion Laboratory, Pasadena, Calif.
- Amoco, Shell, both in Houston
- Sandia National Laboratories, Livermore, Calif.
- Chevron, San Ramon, Calif.
- National Press Club, Washington

ATM speed: 45M bit/sec.

Cost: $1 billion worth of equipment has been donated to the demonstration.

Free switch

CONTINUED FROM PAGE 1

ing a fast switch between large groups of users and centrally located Dell servers.

Ethernet switches are selling like hotcakes because they provide dedicated bandwidth per user, whereas existing Ethernets require numerous users to share 10M bit/sec. of capacity.

The Dell/3Com deal is the latest evidence of ties between server and major internetworking companies. Compaq Computer Corp. started the ball rolling when it teamed with Cisco Systems, Inc. for routing software and bought internetworking vendors Networth, Inc. in November and Thomas-Conrad Corp. in October.

High praise

"This is more than just Dell trying to sell more servers," said Daniel Briere, president of TeleChoice, Inc., a Verona, N.J., consultancy. "It's providing low-cost one-stop shopping for users who don't know much about switching. I'd expect to see other server vendors do similar deals."

One user found the package attractive.

"I'd take a good look at it if we had an application that required us to buy new servers," said 3Com user Michael Green, director of technology at Williams-Sonoma, a San Francisco-based national specialty retailer.

Green said he would like to see other vendors come up with similar programs.

"It'd be great if IBM would come up with a program like this, since we use IBM servers widely," Green said. "Users are increasingly looking for attractive bundles to make life easier."

IBM makes Ethernet switches in addition to PC servers.

Pieces of package

As part of the bundle, Dell server users get 3Com's LinkSwitch 1000 with 12 switched Ethernet ports — which support 10M bit/sec. dedicated pipes to users — and one 100M bit/sec. fat pipe to each server. The two fat pipes use existing twisted-pair wiring.

Server-wise, Dell users get two Poweredge SP 5133-2 servers, which have 133-MHz Pentium processors and the vendor's Safesite Server Management Software. They have 32M bytes of parity RAM. The servers come with 3Com 10/100 Ethernet adapters.

"IS managers should scour the market for deals like this before they make buying decisions," Briere said.

Building Better Business Decisions Through
Better Business Applications
SAS Institute

Yours FREE... SAS Institute's Applications Development Guide

If Your Business Is Data Rich, But Information Poor, Take a Look at Our Model for Informed Decision Making, FREE for a Limited Time!

So much data. So little information. That's the #1 complaint of today's business decision makers.

The reason is simple: most applications development activities center on capturing data, such as updating large databases while maintaining data integrity. But heavy-duty data input shouldn't be an end in itself.

At SAS Institute, we're helping thousands of companies expand their expectations beyond operational applications to encompass true enterprise-wide information delivery. By taking an iterative approach in building and deploying applications, we've created a new model for success in delivering decision support tools.

- Our exclusive MultiVendor Architecture™ makes the applications you build truly portable across all your hardware. Build them once, then take them anywhere with little or no modification.
- Split applications logic to exploit any client/server configuration. Each part of an application runs where it makes the most sense—everywhere from your mainframe and midrange computers to your desktop workstations and PCs.
- Take advantage of a built-in object library that speeds up development time while empowering users to design their own applications.

Whatever your applications development needs, SAS Institute will show you how to meet them...faster and more economically. Start today by taking a look at our free applications development guide. For your copy, simply call our World Headquarters at 919.677.8200 or send us **E-mail at cw@sas.sas.com**

SAS Institute

Phone 919.677.8200 Fax 919.677.4444
In Canada 1.800.363.8397
Or Visit Us on the World Wide Web at http://www.sas.com/
SAS is a registered trademark of SAS Institute Inc. Copyright © 1995 by SAS Institute Inc.

Compaq and IBM haven't decided whether to put value
HP
PCs
intel inside
pentium

[illegible] price for Pentium® processor-based HP Vectra VL4 5/90 PC (on D3681A). [illegible] come with MS DOS® 6.2 and MS Windows for Workgroups 3.11 [illegible] Windows 95 [illegible] OS/2 [illegible] Windows NT [illegible] MS DOS [illegible] trademark of Microsoft Corporation. Pentium and the Intel Inside logo are [illegible] Corporation. OS/2 is a registered trademark of the International Business Machines Corporation. [illegible] 1995 Hewlett-Packard Company [illegible] PPG42

pricing ahead of features or vice versa.

With HP PCs, you don't have to ask which comes first.

Gone are the days of sacrificing features to get reliable, reasonably priced business PCs. Unlike other vendors, which offer good prices only on their low-end boxes, Hewlett-Packard is committed to offering the very best prices on the very best PCs.

Witness the high performance HP Vectra VL4 PC. Designed around new technologies to ensure that your software runs better and faster than ever before, it has one of the most aggressive prices in the industry. A price that has left our competitors gasping.

So stop compromising. You *can* have it both ways. For more information or the name of your nearest HP dealer, call 1-800-322-HPPC, Ext. 1096.† Or visit http://www.hp.com/go/vectra on the World Wide Web.

from
$1,679*

HEWLETT®
PACKARD

Essbase upgrade offers greater efficiency

New versions of multidimensional DBMS shifts work to server, cuts time

By Dan Richman

Greater efficiency in slicing and dicing data is the goal behind improvements made to the latest version of Arbor Software, Inc.'s popular Essbase multidimensional database management system.

Businesses use multidimensional database systems to perform on-line analytical processing (OLAP). OLAP is the process of "frequently analyzing large sets of data to figure out what the hell happened, what to do about it and how well what you decided to do about it is working," said Kirk Cruikshank, vice president of marketing at Arbor in Sunnyvale, Calif.

Essbase 4.0 will be announced next week and will ship by June 1. The product cuts the time necessary to cycle through those steps in several ways, Cruikshank said.

For example, the ranking, filtering and sorting of data is performed on the server, not on the client, before query results are returned to the user. This shift to the server reduces the time required for those tasks and the amount of data that moves across a network.

User-selected portions of the multidimensional database can be recalculated when values change or new data is loaded. Earlier versions required recalculation of the entire DBMS.

"This partial-recalc feature will save us a ton of time," said beta user Jack Wilson. He is director of corporate accounting at Equity Residential Properties, a real estate holding company in Chicago. "Right now, I constantly have users sticking their heads in my door asking, 'Is the recalc done?'"

Redesigned algorithms in the new version further cut the time necessary to aggregate days into weeks, weeks into months and months into years. The new algorithms also speed other compute-intensive but revealing views of data.

Leading the way

Arbor Software's Essbase multidimensional DBMS leads the market for such products, according to Meta Group, Inc. in Stamford, Conn. Strong competitors include Express from Oracle Corp. in Redwood Shores, Calif., and Lightship from Pilot Software, Inc. in Cambridge, Mass.

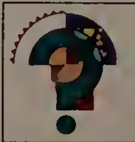
"Calculation time is a very big part of being efficient, and ours has been cut in half," said beta user Brian Post, a senior accountant at TMP Worldwide, Inc. in New York. The Yellow Pages advertising agency uses Essbase to analyze income and expenses.

The Essbase 4.0 server, which will list for $37,500 for five concurrent users, will run on Windows NT, OS/2, Hewlett-Packard Co.'s HP-UX, IBM's AIX and Sun Microsystems, Inc.'s Solaris operating systems. The first two platforms will ship by March 15, and the others are promised by the end of May.

With the purchase of a server, Arbor will provide an unlimited number of client Dynamic Link Libraries, Application Manager management and monitoring packages, and application development tools.

Within the next three months, Arbor will announce products to make Essbase data accessible from World Wide Web browsers, Cruikshank said.

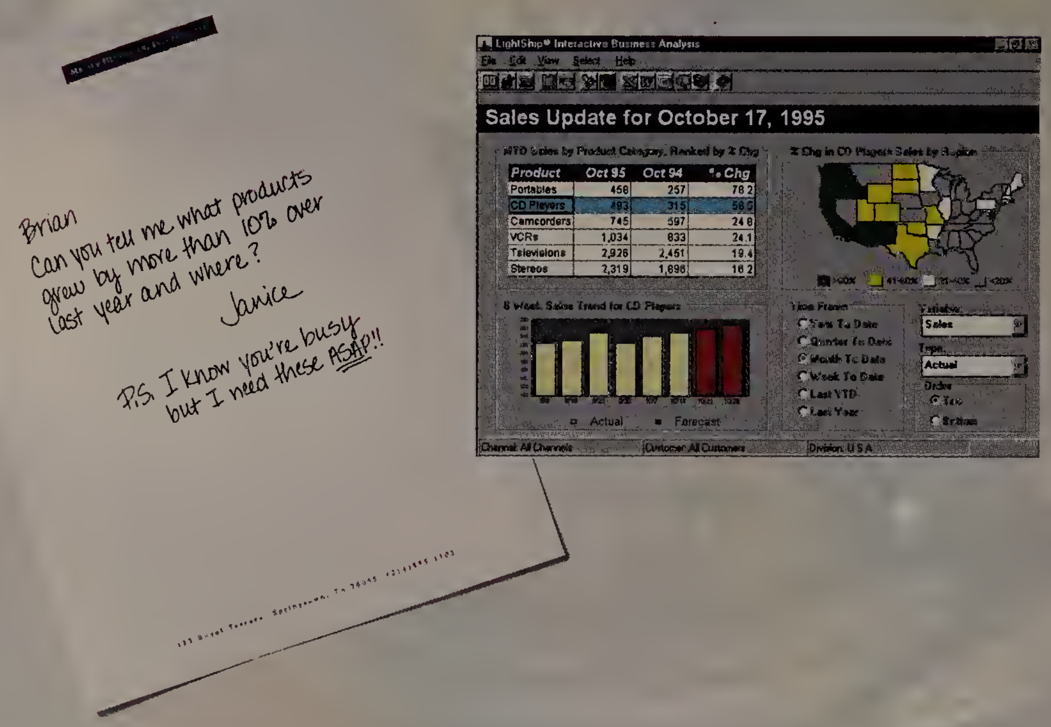
The lighter side of data warehousing. See page 37.



Tom Brigham

ANSWERS ON DEMAND SEMINAR
Call 1-800-944-0094.

Simple Question. **Simple Answer.**



Brian
Can you tell me what products
grew by more than 10% over
last year and where?
Janice
P.S. I know you're busy
but I need these ASAP!!

LightShip® Interactive Business Analysis

Sales Update for October 17, 1995

Product	Oct 95	Oct 94	% Chg
Portables	456	257	78.2
CD Players	493	315	56.5
Camcorders	745	597	24.8
VCRs	1,034	833	24.1
Televisions	2,926	2,451	19.4
Stereos	2,319	1,996	16.2

Chances are you're altogether too familiar with "simple questions" like these. Invariably, they come at the worst possible times. Usually, they require immediate attention. And, more often than not, there's hardly anything simple about answering them. Unless, of course, your organization is one of the thousands that have come to rely upon LightShip®, from Pilot Software, for the power of answers on demand.

Extremely intuitive. Completely open. And incredibly easy to implement and customize. LightShip enables you to rapidly deploy scalable EIS, DSS, OLAP and Data Warehouse applications that empower decision-makers to visually explore and analyze vast quantities of corporate information.

With LightShip's point-and-click interactive business analysis tools, users can take full advantage of powerful multi-dimensional technology to ask complex business questions in simple business terms. What's more, they can obtain clear, consistent answers in a fraction of the time required by traditional decision support systems. All of which means they can spend considerably more time and energy interpreting results, uncovering hidden opportunities and implementing winning strategies.

For straightforward answers to your most complex business challenges, simply call 1-800-944-0094 and we'll provide you with the information you need to put the proven power of LightShip to work for your company.

Pilot Software
a company of The Dun & Bradstreet Corporation

Answers on Demand.

© 1996 Pilot Software, Inc. LightShip is a registered trademark of Pilot Software. Pilot Software, One Canal Park, Cambridge, MA 02141 (617)374-9400 http://www.pilotsw.com/

The wait for new technology is getting shorter.

In some places, there's no wait at all.

Bravo MS-T, 150 MHz Intel Pentium Pro processor

Pronto. Right now. Yesterday even. AST and the latest Intel Pentium® Pro chip are ready to accelerate through your workload in a new AST desktop. The Bravo MS-T is one feature-packed machine designed to run all your most powerful 32-bit software. (Even the stuff some techno-wizard will think up next year.) Windows NT™? It could be on your desk by, let's say, Tuesday. Instead of waiting for a faster computer, you'd be using one. Call 800-876-4AST. Or on the net: http://www.ast.com. Today, running a little fast is a good thing.

AST® COMPUTER

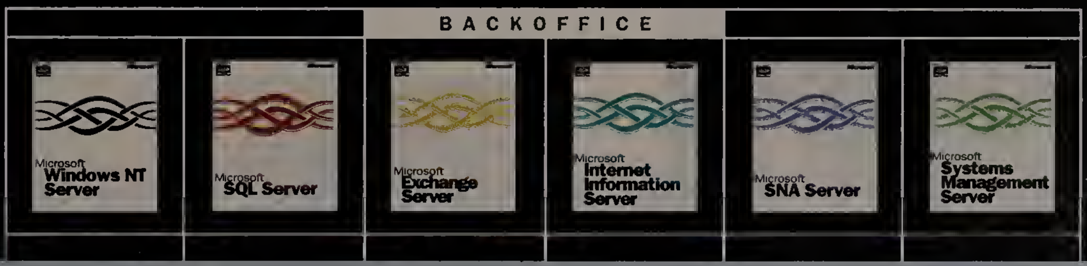
Where things are HAPPENING™

150 MHz Pentium Pro processor, 16 MB RAM standard, 256 KB second-level cache, 1.6 GB hard drive, 4X EIDE CD-ROM, integrated ATI mach64 graphics, four PCI and three ISA slots, 5 drive bays.

© 1996 AST Research, Inc. AST is a registered trademark of AST Research, Inc. Intel, Pentium, and the Intel Inside logo are registered trademarks and the Pentium Pro processor logo is a trademark of Intel Corporation. Windows NT is a trademark of Microsoft Corp. Information may change without notice

Microsoft
WHERE DO YOU WANT TO GO TODAY?™

What you're trying to put together is already built.


BACKOFFICE
Microsoft Windows NT Server
Microsoft SQL Server
Microsoft Exchange Server
Microsoft Internet Information Server
Microsoft SNA Server
Microsoft Systems Management Server

A family of products, built on Windows NT Server, designed to work together and apart, and with what you have.

The only multipurpose file-and-print, application, and communications server

A robust and scalable database management system for distributed environments

The only e-mail server with built-in groupware and unmatched reliability and scalability

A powerful platform for publishing on the Internet and Intranet

A truly flexible gateway for integrating AS/400s and mainframes with LANs

A complete and centralized solution for managing networked PCs

Your sights are set on enterprise solutions. So why does it feel like your focus is always on integrating systems?

It needn't be. Because now you can choose from a range of products and be certain they'll work together. Each of the servers in the Microsoft® BackOffice™ family integrates seamlessly with each other and with just about anything else you can think of – everything from NetWare® to UNIX® to DB2® to ORACLE.® And all are based on Windows® standards. So your desktops and servers can share one architecture. And you can enjoy simpler, more consistent administration.

Now information can flow unimpeded – from mainframe to desktop, from mail system to database, across networks, and over the Internet. So users can find, analyze, and share what they need. And you can stay focused on the solutions that run your business, instead of the foundation that supports them. To learn more about Microsoft BackOffice, call (800) 426-9400, Dept. A024. Or visit our Web site at http://www.microsoft.com/backoffice.

©1996 Microsoft Corporation. All rights reserved. Microsoft and Windows are registered trademarks and BackOffice, *Where do you want to go today?*, and Windows NT are trademarks of Microsoft Corporation. DB2 is a registered trademark of International Business Machines Corporation. NetWare is a registered trademark of Novell, Inc. ORACLE is a registered trademark of Oracle Corporation. UNIX is a registered trademark in the United States and other countries, licensed exclusively through X/Open Company, Ltd.

IBM middleware to ease wireless access

By Mindy Blodgett

IBM beat the wireless drum last week with its announcement of Artour, a client/server middleware package aimed at providing hassle-free access to the enterprise network.

IBM's entrance into the wireless arena [CW, Feb. 19] is bound to add heft to a struggling industry in need of a boost, industry observers and users said.

"Other middleware has provided similar features, but they weren't IBM," said Virginia Brooks, an analyst at Aberdeen Group, Inc. in Boston. "The IBM name will carry a lot of weight with users who have been resisting wireless."

Lance Crawford, product manager at Sabre Computer Service in Fort Worth, Texas, said, "Anything that makes wireless easier is sorely needed."

Artour won't require modifications to back-end applications. It will support connections across incompatible wireless networks, including the ARDIS Co., RAM Mobile Data and cellular digital packet data.

Artour has two basic components, which are priced at approximately $345 per user for a 100-user site or $175 per user for a 1,000-user site. The components include the following:

- Artour Mobile, which is client software installed on an OS/2 or Windows-based notebook, is equipped with an integrated wireless modem or wireless PC card. The software will let users communicate through a wireless network based on the TCP/IP standard.
- Artour Gateway, which operates on an IBM RISC System/6000, is connected to both the enterprise network and the wireless service provider.

ARDIS deal

The ARDIS Co., a wireless radio network provider, last week announced it will resell IBM's wireless modem for ARDIS in a package that will include hardware, software, service and support. Pricing will start at $400.

Users also have the option of wireless 3270 terminal emulation support through the following applications:

- Artour Emulator Express Client, which acts as an AS/400 or Systems/390 terminal, moves only new or updated information over the wireless network.
- Artour Emulator Express Server, which provides access to corporate networks using SNA.

Artour Emulator Express will cost $645 per user for 100 users and $445 per user for 1,000 users.

In addition, ARDIS last week announced a trial service of Artour Emulator Express on the ARDIS wireless network at the Network World Unplugged show in San Jose, Calif. For a period of 90 days, beginning March 15, ARDIS will provide unlimited air time, wireless modems, a host connection, user training, software installation and support for up to 25 users. The service will start at about $20,000.

THE ANSWER TO YOUR PRAYERS!

New Dimension Software's Enterprise Production Management™ solution is a real blessing to distributed computing. It gives you what you've only dared hope for: true interoperability across diverse environments and integrated production control with vital system activities throughout the enterprise. All from one, divinely easy-to-use graphic interface—to anywhere in the world.

Enterprise Production Management is an integrated solution by New Dimension Software consisting of production scheduling and automated systems operations—from one central point of management. (This is paradise!) It delivers what our competitors only promise—interoperability you can have faith in.

But let us make a believer out of you. Find the answer to your prayers at one of our free seminars on Enterprise Production Management. To register for a seminar near you or to get additional information on this heavenly solution, please give us a call.

	New Dimension Software's Enterprise Production Management	Computer Associates' Unicenter	Platinum Technology's Autosys/Altai
Manage production interdependencies among mainframe and non-mainframe systems—right now!	YES!	?	?
Integrate production control with vital system activities throughout the enterprise, from database status to network availability—right now!	YES!	?	?
Easy-to-use, intelligent, central point of management for the entire production environment—right now!	YES!	?	?

We invite you to compare!

NEW DIMENSION SOFTWARE™

800.347.4694, Ext. 522 or 714.757.4300, Ext. 522.

Formerly 4th Dimension Software

Enterprise Production Management is a trademark of New Dimension Software. Other products are trademarks of their respective companies

Enterprise Production Management Seminar Location Dates:

Los Angeles	Dallas	Atlanta	Boston	New York	Washington D.C.	Chicago	Toronto
February 29	March 5	March 7	March 12	March 14	March 19	March21	March 26

96
CORPORATE TECHNICAL RECRUITING CONFERENCE
COMPUTERWORLD
[illegible]NE 2-5, 199[illegible]
SUB[illegible]N D[illegible], CO
[illegible]-800-[illegible]-9204

You can leave network reliability to chance, or leave it to new...

NetShelter™

100% COMPAQ® COMPATIBILITY FOR 20% LESS

Introducing NetShelter—a high quality, free-standing rack enclosure for storing all your network and power protection equipment. NetShelter saves floor space, eliminates cabling "rat's nests," and physically protects your equipment to keep your network running—all in an attractive, user friendly design. When integrated with APC's power protection, management, and environmental monitoring options, NetShelter provides a total solution for protecting your network environment.

DESIGNED FOR EASY SELECTION AND EASY INSTALLATION

NetShelter provides 73.5 vertical inches (42U) for industry-standard, 19-inch, rack-mount equipment as well as computer-grade ventilation to reduce heat build-up. There's no need to spend hours selecting from dozens of configurations. APC makes it easy, with a complete rack package right out of the box, requiring no cabinet assembly. The unit fits through standard office doors (unlike other racks... surprise!) and rolls into place on its integrated stabilizing feet and heavy duty casters. Back rails can be repositioned to various depths and cross members can be relocated for side-mounted equipment and convenient cable management.

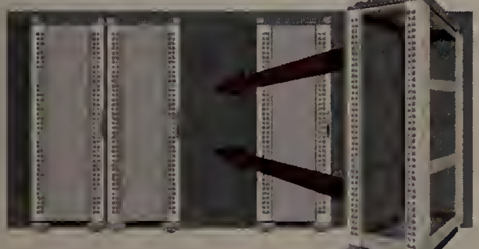
THE EASY ACCESS YOU WANT THE SECURITY YOU NEED

Access to the sides of the cabinet for equipment installation and service is provided in seconds by simply unlatching the locking side panels.

Moreover, locking handles in both the front and rear provide a tamper resistant environment. Optional switch kit combined with an APC Measure-UPS permits cabinet access monitoring for remote locations or during non-business hours.

FULL COMPAQ® COMPATIBLE RACK FOR 20% LESS

Choose APC NetShelter for easy installation of Compaq's Rack-Mountable ProLiant® Server line, external disk storage and accessories with our optional mounting kit, at a total price much less then comparable premium enclosures. NetShelter's fully ventilated design exceeds Compaq's requirements for third-party racks.



EASY EXPANDABLE DESIGN FOR GROWING SYSTEMS

When your system needs exceed one cabinet, you can easily create a bay of connected NetShelters in minutes! Unlike other rack enclosures, NetShelter expansion requires minimal time, cost and parts. Simply connect your first NetShelter to our expansion model that includes preinstalled baying hardware and use the side panels from your original.

[illegible] Rights Reserved. [illegible] trademarks [illegible] property of their respective owners.

UPS power management and diagnostic features increase uptime, reduce staff costs

PowerChute plus offers unattended system Shutdown, extensive UPS testing/status, Remote UPS management and Environmental/power monitoring so you can head off potential downtime. For SNMP-based WANs, APC's PowerNet provides comprehensive control from your network management console.

Share-UPS™ offers reliable shutdown for multiple servers even for different OSs

Provides a rack mountable solution for unattended safe shutdown of up to 8 servers (running the same or even different operating systems)-all from one UPS. Now you don't have to buy a separate UPS for each server in a mixed-OS environment.

Measure-UPS™ monitors NetShelter's environment even during power outages

APC's Measure-UPS prevents data or hardware damage by monitoring temperature, humidity, physical access and other external sensors. When alarm conditions occur, Measure-UPS along with APC software or hardware accessories can alert you and initiate a safe system shutdown. Moreover, network management nightmares like unauthorized access can be easily monitored with our Measure-UPS switch kit for NetShelter door openings.

ProtectNet™ data & network surge protection blocks "backdoor" surge damage, guaranteed to $50,000

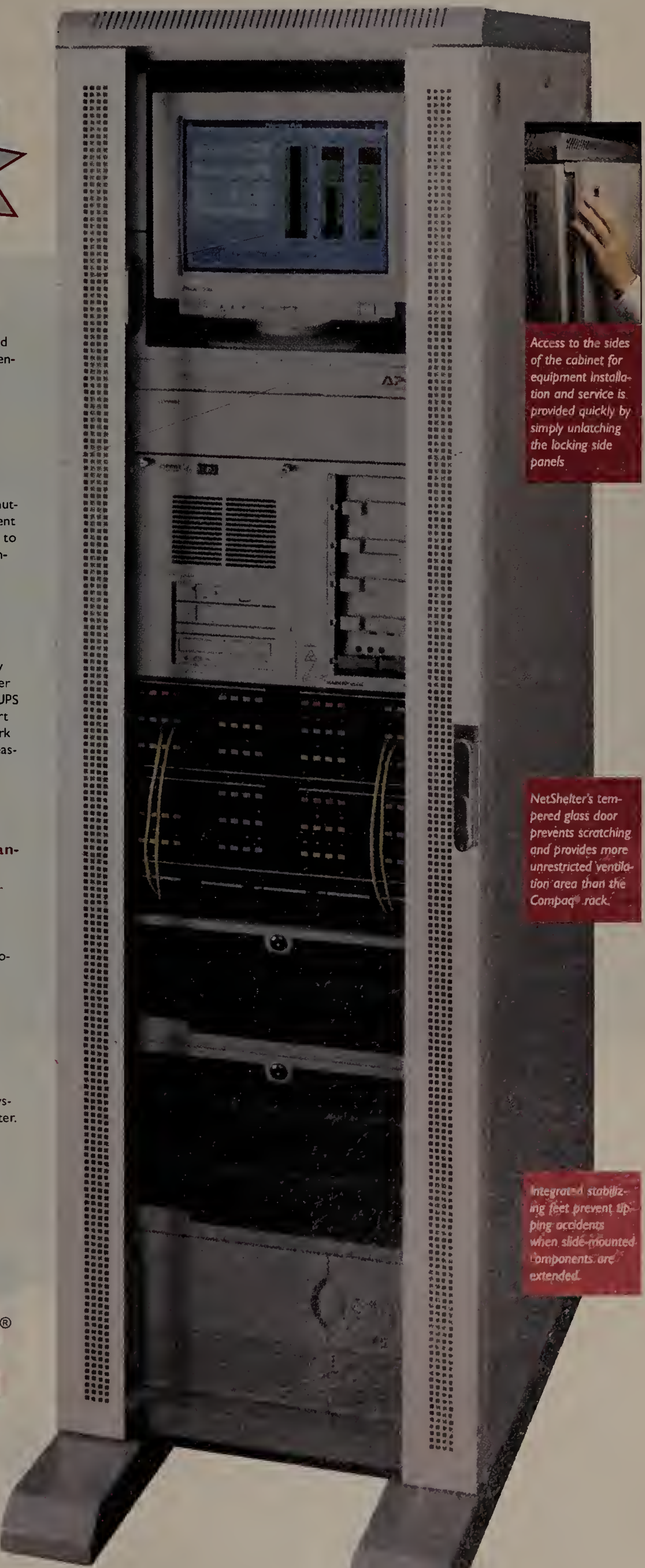
Multi-port rack-mountable modules (PNET4) protect your Ethernet and token ring network from lightning and surge events. Also available in telephone (PTEL1-4). When used with an APC UPS to completely bulletproof your system, APC provides up to a $50,000 repair/replace policy on protected equipment (see policy for details).

Smart-UPS RM rack-mount UPS provides performance power management for advanced networks

The ideal uninterruptible power supply (UPS) for rack mounted file servers, hubs, routers, telecommunications systems and other mission-critical equipment within NetShelter.

A few of Smart-UPS RM award winning features:

- SmartSlot™ accessories offer custom functionality.
- SmartBoost™ and SmartTrim™ correct under and overvoltages without battery drain.
- QuickSwap™ allows safe and easy replacement of batteries while the system stays up
- 100% compatibility with Compaq® rack servers and Insight Manager



Access to the sides of the cabinet for equipment installation and service is provided quickly by simply unlatching the locking side panels

NetShelter's tempered glass door prevents scratching and provides more unrestricted ventilation area than the Compaq® rack.

Integrated stabilizing feet prevent tipping accidents when slide-mounted components are extended.

APC®

AMERICAN POWER CONVERSION

(800)800-4APC

http://www.apcc.com
Dept. A8
Fax: (401) 788-2797 • PowerFax™: (800) 347-FAXX
Compuserve: GO APCSUPPORT • Internet: apctech@apcc.com
US/Canada: (800)800-4APC • Europe: (+33)(1)64.62.59.00
Latin America: (401) 789-5735 • Asia/Pacific: (81)(3)5295-1988

COMPAQ

Has It Changed Your Life Yet?

The problem with trouble is that usually by the time you find out about it, it's too late. Not so with Compaq Intelligent Manageability. Compaq Intelligent Manageability is a superior collection of preinstalled features and tools found only on the Compaq Deskpro. Together, they work to detect and eliminate a variety of potential problems on your network before they become real ones. Fault Management features like our IntelliSafe drive, which not only notifies you of impending failure but also backs itself up, minimizing loss of mission-critical data

YOU'RE FLYING ALONG AT 25,000 FEET WHEN SUDDENLY THREE OF THE ENGINES QUIT. NOW WOULD BE A GOOD TIME TO TALK ABOUT SUPERIOR FAULT MANAGEMENT.

and PC downtime. And Asset Management, whose features help you keep track of hardware and software across the network from the comfort of your desk. Because all the information you need can be delivered remotely to your PC. Compaq Intelligent Manageability also includes a wide range of security features designed to keep your network secure. Which all adds up to providing the best and most comprehensive solution for managing PCs and predicting trouble on your network. Because when there's trouble, don't you want to know about it–before it happens?

As with all Compaq PCs, Deskpro is covered by our free 3-year limited warranty. For more information on our full line of Compaq desktop PCs, call us at 1-800 345-1518 or reach us on the Web at www.compaq.com. In Canada, we can be reached at 1-800-567-1616. ©1996 Compaq Computer Corporation. All rights reserved. Compaq and Deskpro registered U.S. Patent and Trademark Office. Some features available with Compaq Deskpro and independent software applications. Other features only available with Windows 95.

WEEK 6 OF 19

COMPUTERWORLD's TechnoTrivia

Welcome to COMPUTERWORLD's TechnoTrivia

It's fun – and easy to play each week!

1. Look for the COMPUTERWORLD TechnoTrivia icon to find the answers (planted throughout this issue) to the TechnoTrivia questions listed on this page.
2. Enter via COMPUTERWORLD's Web site on the Internet: **http://www.computerworld.com**
3. On the Web site Entry Form, identify the page number in this week's issue of COMPUTERWORLD where the correct answer to each TechnoTrivia question appears.
4. Or you may enter by fax using the Fax Entry Form below.

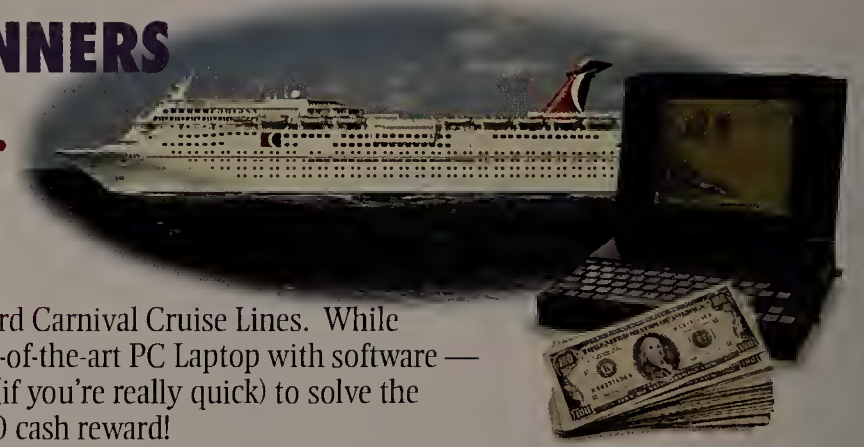
THIS WEEK'S QUESTIONS:

1. In what *Walt Disney* movie do the main characters live in a computer?
2. Who is generally credited with having invented "morphing?"
3. Nomad, M-5, Noram and Landru were all computers that appeared in what TV series?
4. Who invented the mouse and how many buttons did it have?
5. In what year did *Time* Magazine name the computer its "Man of the Year?"

Trivia questions and answers provided and/or verified by Christopher Morgan and The Computer Museum.

Put your RAM to the test!

5 GRAND PRIZE WINNERS



A BAHAMAS CRUISE FOR 2...
A LOADED LAPTOP...AND
A SHOT AT $5,000 IN CASH!

Win a 4-day cruise to the Bahamas for two aboard Carnival Cruise Lines. While onboard, all five winners will be awarded a state-of-the-art PC Laptop with software — plus a treasure map with all the clues you need (if you're really quick) to solve the ultimate TechnoTrivia puzzle and earn a $5,000 cash reward!

3 FIRST PRIZES

A Sony CD-ROM Discman® PRD-150 Player

A fully portable multimedia solution for laptop computers! A full-feature CD-ROM player with PCMCIA Type II card-plus stereo headphones. Photo CD and Windows compatible.

OR WIN ONE OF ...

5 SECOND PRIZES

A Sony CCD-PC1 Computer Color Video Camera

The complete video-conferencing and audio-video capture setup! A high-resolution color video camera on a 10" flexible arm with built-in microphone, manual focus control for close-ups and an iris control for lighting adjustments.

Grand, First and Second Prize Winners will be announced by July 15, 1996.

FAX ENTRY FORM FOR WEEK 6

Question #	Correct Answer on Page #
1.	
2.	
3.	
4.	
5.	

Name
Company
Title
Address
City
State Zip
Phone
Are you a COMPUTERWORLD subscriber? ☐ yes ☐ no (optional)

TWO WAYS TO ENTER!

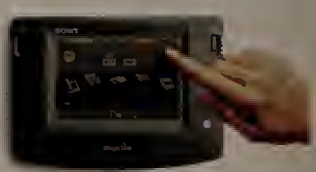
1. Enter via our Web site — at http://www.computerworld.com
OR
2. Fax in your entry by:
- Completing entry form below
- Faxing the copied page to:

1-402-572-6410

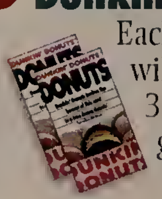
PLUS - SUPER PRIZES AWARDED EACH WEEK!

1 Sony Magic Link™ Personal Communicator

Use smart messaging to help manage all your electronic communications – fax, e-mail, phone or pager.



5 Dunkin' Donuts "TechnoTrivia Tuesday" Coffee Breaks



Each Tuesday five winners and their associates (up to 20 people) will receive Dunkin' Donuts gift certificates (or alternative) for 3 dozen donuts, a Dunkin' Donuts coffee thermos, a pound of ground coffee plus an engraved TechnoTrivia plaque.

Please pass along this issue of COMPUTERWORLD to an associate after you have finished playing the game.

NO PURCHASE REQUIRED. This offer is governed by a complete set of Official Rules, published on COMPUTERWORLD's web site at http://www.computerworld.com. To receive a written copy, send an SASE to COMPUTERWORLD's TechnoTrivia Rules, P.O. Box 4051, Marblehead, MA 01947. Find the five correct answers to the TechnoTrivia questions in each issue and complete the entry form by entering the page number where you find the correct answer to each corresponding question. Play all 19 weeks and increase your chances of winning a weekly prize or one of 13 exciting final prizes. One entry per person per week. TechnoTrivia is open to residents of the U.S. 18 years of age or older who are IS professionals – except employees of companies that manufacture, distribute or resell computers and computer related equipment, employees and their families of International Data Group, Inc.(IDG), their affiliates, subsidiaries, their advertising and production agencies as well as other publishing companies serving the computer or high technology industry. Weekly and final prize winners will be selected at random from among all those submitting correct answers. Sweepstakes drawings will be conducted by MILL HOUSE McCABE, INC., an independent judging organization, whose decisions are final in all matters relating to this offer. Weekly entries must be received by 11:59 pm on Thursday following the publication of each issue of COMPUTERWORLD. All entries eligible for the Final Prizes must be received by 11.59 pm, June 3, 1996. Void where prohibited.

Business as usual for Notes

By Tim Ouellette

IBM, Lotus in sync on plans for groupware

> **"I believe in eating your own cooking. So we are going to put an internal Notes network throughout the company."**
>
> *— Louis V. Gerstner, IBM chairman*

Same story, different channel.

Since IBM bought Lotus Development Corp. last June, Notes users have been relieved to see business as usual. That is, except for the financial boost provided by IBM to cut Notes prices, the drive to get the Notes 4.0 upgrade out the door and the higher-octane marketing push in the face of competition from World Wide Web technology.

IBM is striving to increase the number of Notes users, which already has doubled since the merger (see chart). But its plans are wildly ambitious, calling for the number of Notes users to double every year through the end of the decade.

"I am very pleased about the merger and the direction they are taking," said Dennis Murray, information officer for drug registration for regulatory affairs at Sandoz Pharmaceutical Corp. in East Hanover, N.J. He echoed the reaction of several other users interviewed recently.

"I think IBM clearly understands how to manage enterprise data, and Notes is the best option to manage discussions and business processes," Murray added.

Because Sandoz Pharmaceutical uses both Notes and IBM's DB2, Murray is waiting for products to link the two systems. Today, he has to cope with two separate islands of information — one with Notes in workgroups and the other with the mainframe database software in the enterprise.

One hopeful sign is the MQSeries Connector for Notes, which is due later this year. It will use IBM's MQSeries middleware to let Notes applications exchange data with legacy systems.

IBM views Notes as a major piece of middleware, along with MQSeries and CICS. The computer giant intends to use Notes to give users a standard interface above the operating system to connect the desktop and enterprise environments, according to a report by D. H. Andrews Group, Inc. in Cheshire, Conn.

But how long the IBM/Lotus honeymoon will last is a matter for debate. IBM needs to get a return on its $3.5 billion investment in Lotus, and the perceived threat to Notes from similar technology available on the Web looms ever larger, analysts and users said.

"The good news is IBM doesn't seem to be interfering with Lotus," said John Hodge, chief information officer of NAC Reinsurance in Greenwich, Conn. "But the bad news is [IBM] believes that Notes is such a key product that there is a lot of integration work that can take away from the Lotus products themselves."

Competing products from traditional software giants and emerging Internet vendors such as Netscape Communications Corp. are on the way this year (see related story below).

Microsoft Corp.'s Exchange is expected to hit the streets this quarter. The company already ships the free client software with Windows 95. Yet another threat comes from Novell, Inc.'s Groupwise XTD software, due out by midyear, which will provide strong integration with popular Novell NetWare LANs.

The Notes price cuts announced in December helped pre-empt some of this competition and win over many users, however.

The cuts "helped alleviate the one concern we had to this point, which was price," said Tim M. Crawford, information access manager for Notes at National Semiconductor Corp. in Santa Clara, Calif. He said the previous attempt at a low-cost version of Notes — Notes Express — wasn't cheap, and it didn't offer the Notes 4.0 features to make its use worthwhile.

Notes customers also may be heartened to know that IBM is rolling out Notes in its own massive operation. The goal is to install up to 100,000 seats by the end of the year at the 225,000-employee computer giant, according to IBM Chairman Louis V. Gerstner.

Low profile

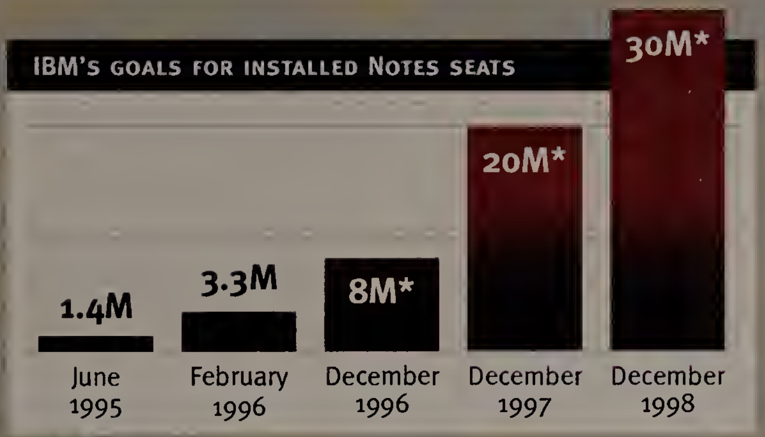
IBM has given Lotus free reign to get Notes 4.0 and 4.x upgrades out the door. And at the annual Lotusphere conference held recently, IBM had a very low profile. Yet while Lotus retains its name and identity, the company has had a hard time retaining high-level executives.

Since the $3.5 billion buyout, at least 11 high-level Lotus executives have quit. That includes the recent departure of Jeffrey Beir, senior vice president of Lotus' applications business, who left last week. But Notes creator Ray Ozzie has vowed to stay put at least through the next major upgrade of Notes.

As executives have trickled out the Lotus doors, users have consistently maintained they aren't worried — as long as the Notes product team remains intact and focused.

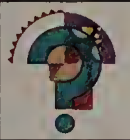
Notes takes a seat

While some analysts predict Notes will lose groupware market share to Microsoft and Novell, others believe IBM can reach its lofty goals



*Projected

Source: IBM, White Plains, N.Y.



1984

Notes vs. the Web: What's up with that?

Will the rise of the Web ultimately mean the fall of Notes?

To some industry observers and potential groupware users, the improvement in low-cost Web technology signals the arrival of a serious and threatening alternative to Notes.

Still others see Notes 4.0's Web integration features, strong business applications and expanding developer channel as vital to IBM's success in the Internet market. In fact, the push by Lotus to have Notes work in conjunction with Web technology is vital to Notes' survival, said Peter Raulerson, president of ParaTechnology, Inc. in Bellevue, Wash.

Notes users are increasingly voicing their interest in combining Web-enabled Notes business applications with a mix of Notes clients and cheap Web browsers for casual groupware users.

"A lot of people see the Internet as the way to create business applications that hook companies with suppliers and customers at first blush," said Scott McCready, an analyst at International Data Corp. in Framingham, Mass. "But the Web doesn't have tools to allow them to do that."

But observers admit that Web technology and emerging standards — such as Netscape's Navigator browser combined with electronic mail and Web servers — are slowly improving. With better security and management features, many users think they can achieve Notes-like capabilities with more open and cheaper Web products, Raulerson said.

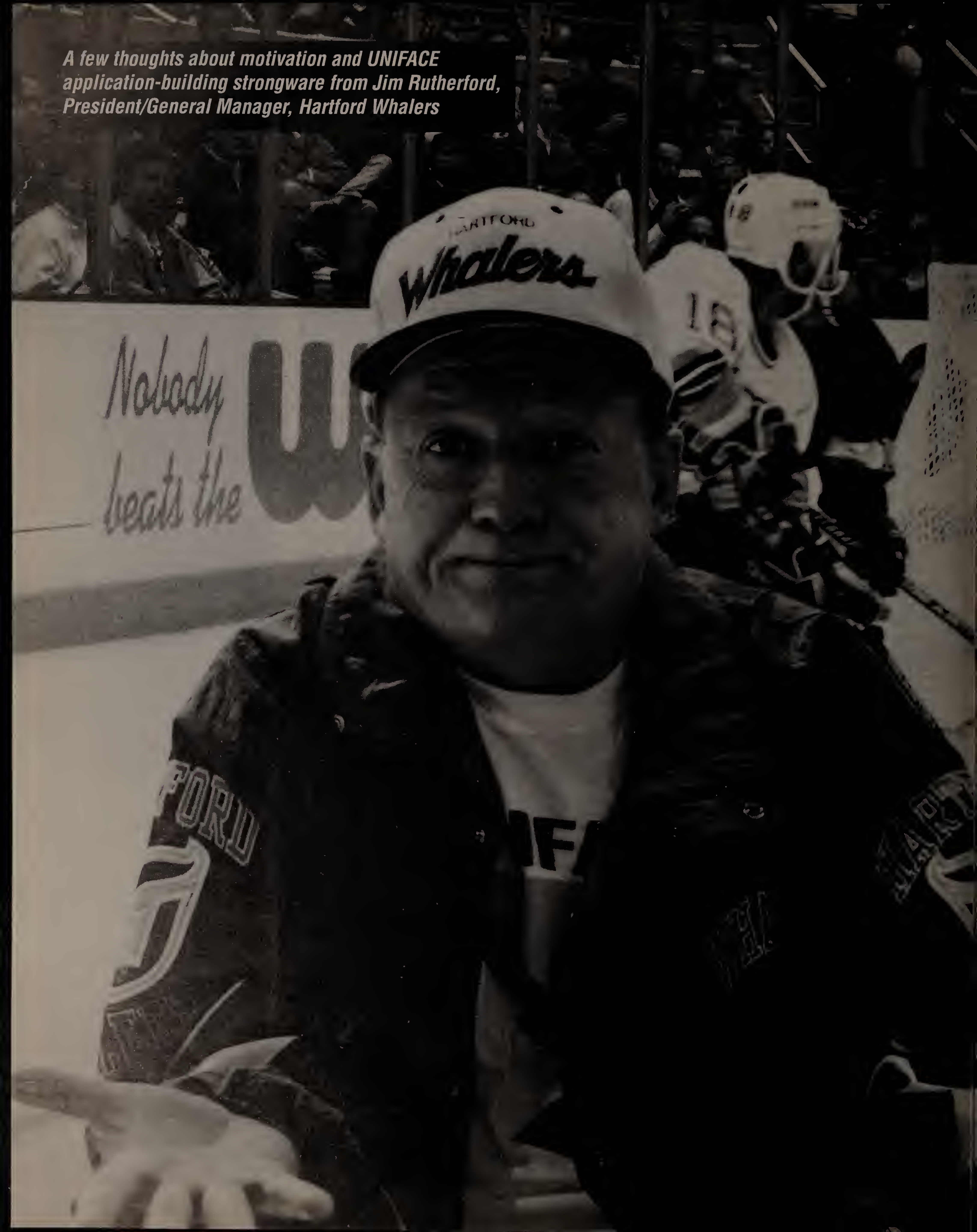
For now, though, IBM sees Notes 4.0 as a way to enhance its own Internet business while connecting IBM enterprise systems with the Web. The new version of Notes can publish documents to a Web server and support Internet protocols. It also comes with a Web browser.

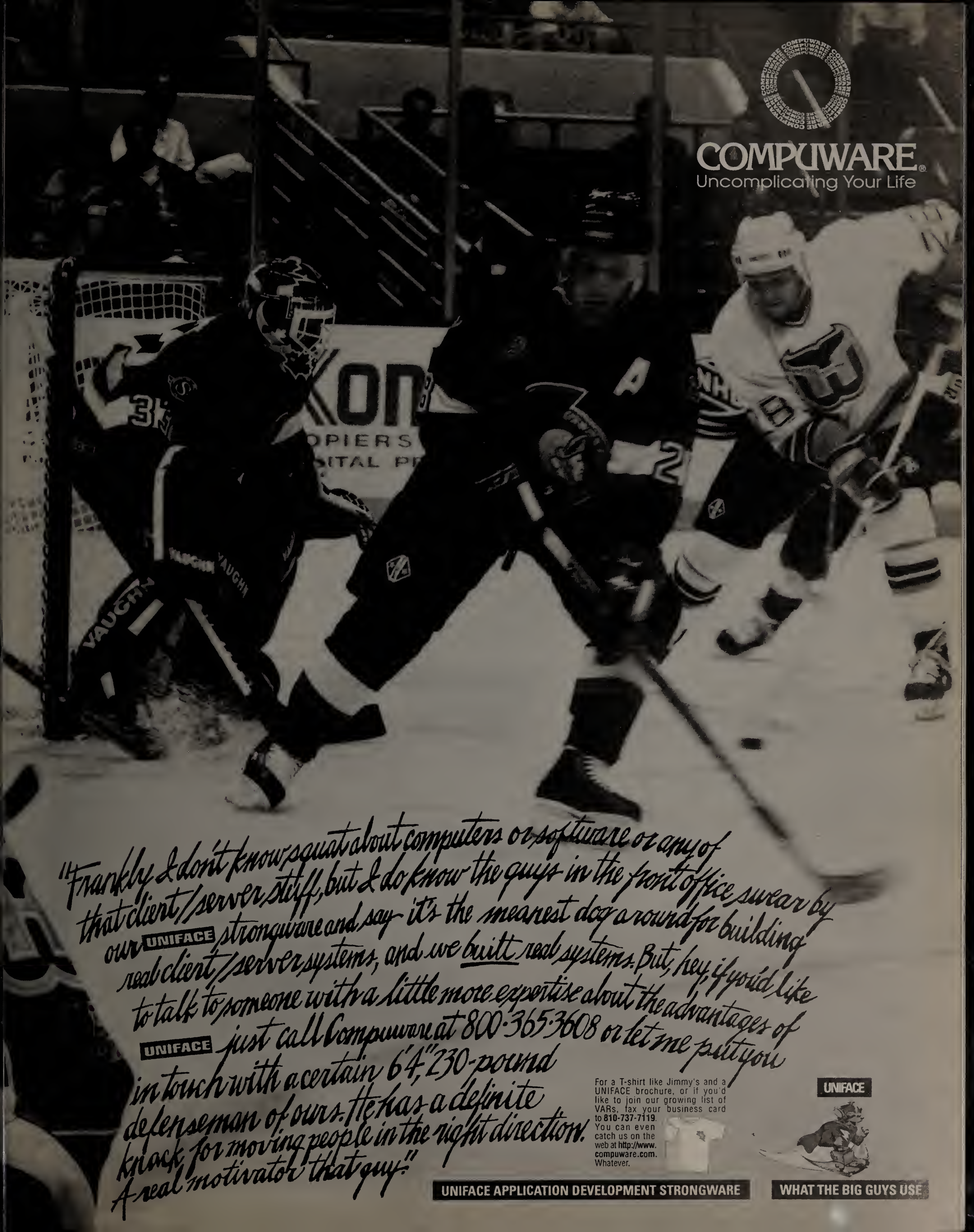
Notes "is absolutely core to where IBM wants to be in the next decade," said Matt Cain, an analyst at Meta Group, Inc. in Stamford, Conn.

IBM's plans to become a primary player in the network-centric computing environment by integrating large enterprise systems with desktop-oriented applications. "Notes is going to be the vehicle to make all that legacy data relevant to users," Cain said.

— Tim Ouellette

A few thoughts about motivation and UNIFACE application-building strongware from Jim Rutherford, President/General Manager, Hartford Whalers





COMPUWARE®
Uncomplicating Your Life

"Frankly I don't know squat about computers or software or any of that client/server stuff, but I do know the guys in the front office swear by our UNIFACE strongware and say it's the meanest dog around for building real client/server systems, and we built real systems. But, hey, if you'd like to talk to someone with a little more expertise about the advantages of UNIFACE just call Compuware at 800-365-3608 or let me put you in touch with a certain 6'4", 230-pound defenseman of ours. He has a definite knack for moving people in the right direction. A real motivator that guy."

For a T-shirt like Jimmy's and a UNIFACE brochure, or if you'd like to join our growing list of VARs, fax your business card to **810-737-7119**. You can even catch us on the web at http://www.compuware.com. Whatever.

UNIFACE

UNIFACE APPLICATION DEVELOPMENT STRONGWARE

WHAT THE BIG GUYS USE

Computer Industry

Licensing deal to broaden Mac appeal

Apple/Motorola

By Lisa Picarille

Apple Computer, Inc.'s decision to license its Mac OS to Motorola Computer Group won't immediately impact Macintosh loyalists. But the attempt to more broadly deploy the operating system could help Apple attract new users.

Motorola joins a slowly expanding list of Mac OS licensees. They include Umax Computer Corp., which recently joined forces with Radius, Inc.; DayStar Digital, Inc.; Power Computing Corp.; Pioneer Electronics Corp.; and Ing. C. Olivetti & Co.

Apple's decision to grant Motorola the ability to sublicense the Mac OS to additional vendors may result in further proliferation of the Mac OS. That could help boost Apple's market share.

The clone agreements also will offer Macintosh users a wider variety of systems to choose from other than just Apple machines.

The more Apple can get its operating system software out there, "the better it is for them and for us," said Mark Munro, corporate Macintosh network manager at Jack Morton Productions, Inc. in New York. The company specializes in creating corporate training materials.

Motorola already is shipping desktop, entry-level servers and two-way multiprocessor servers that are based on the PowerPC chip. The bulk of the PowerPC systems sold by Motorola run IBM's AIX, said Joe Guglielmi, general manager at Motorola Computer Group.

But he said he expects Microsoft Corp.'s midyear delivery of Windows NT 4.0 to increase Motorola's sales of PowerPCs that run NT.

Motorola, like Apple and IBM's server division, is changing its product lines to meet the specifications of the Common Hardware Reference Platform (CHRP). CHRP-compliant systems will run a variety of operating systems, including Sun Microsystems, Inc.'s Solaris, Windows NT, AIX, the Mac OS and Novell, Inc.'s NetWare.

Motorola officials said the company's CHRP systems will be available in the second half of the year.

Motorola may manufacture Macintosh clones if there is demand. But that isn't the thrust of this agreement because System 7.5.x, the current version of the Mac OS, is still closely tied to the hardware.

Copland, Apple's next generation of the Mac OS, will be separated from the hardware. This will make it easier for licensees to create CHRP-compliant systems that will run the Copland operating system.

Motorola's licensing of the Mac OS is "a public relations move to show support for Apple," said Joe Ferlazzo, an analyst at Technology Business Research, a market research firm in Hampton, N.H. "Apple is the one [PowerPC] volume player, and Motorola has to do all it can at this juncture to show strong support for Apple."

Apple may get more support via a sublicensing deal between Motorola and Panda Electronics Group in China, whereby Panda will distribute Mac OS-compatible systems.

The agreement also opens the door for Motorola to license the Mac OS on its boards to other systems makers, such as Gateway 2000, Inc. and Packard Bell Electronics, Inc.

"Seems like Motorola wants to steal the Intel model of building motherboards for the entire industry. PowerPCs would say, 'Motorola inside,'" said Pieter Hartsook, editor of "The Hartsook Letter," an industry newsletter in Alameda, Calif.

Here's the deal

Major reasons the Mac OS will run on a variety of systems from different vendors:

- Motorola is the key supplier of PowerPC chips, and the company makes PowerPC systems
- Motorola's systems run AIX or Windows NT
- The licensing deal with Apple lets Motorola run the Mac OS on its systems
- Motorola can sublicense the Mac OS to other vendors

IBM cans OS/2 on PowerPC; platform seen as threatened

By Lisa Picarille
and Jaikumar Vijayan

IBM's recent decision not to produce a commercial version of OS/2 for desktop PowerPC systems has left Apple Computer, Inc.'s Mac OS virtually alone for now to carry the PowerPC flag on the desktop.

But now that Apple has licensed its Mac OS to Motorola, Inc., which is already a partner in the PowerPC initiative, the Mac OS will have other vendors' support besides just Apple's (see story above).

Microsoft Corp.'s Windows NT, which also runs on the PowerPC, is expected to dent the market sometime this year.

Nevertheless, IBM's decision is seen as a loss for the PowerPC.

IBM officials maintained that the company remains committed to the PowerPC in its RS/6000 and AS/400 product lines, but some observers questioned whether the overall PowerPC initiative can gain momentum as a mass-market alternative to the Intel Corp. juggernaut.

This also has raised fears that potential systems makers and independent software vendors might be scared away from the platform.

Initiative can't run

John Dunkle, president of Workgroup Strategic Services, Inc., a market research firm in Portsmouth, N.H., said the PowerPC initiative has become a "two-legged dog" because of the other problems the PowerPC partners face. These problems include the following:

- Motorola has been criticized for delays in bringing out new PowerPC chips and an inability to leapfrog the capabilities of forthcoming Intel Pentium processors.
- Apple, which has so far sold more than 4 million Power Macintosh systems and accounts for more than 90% of the demand for the PowerPC chips, faces its own well-publicized financial and management problems.
- Macintosh clone makers and other PowerPC vendors haven't been able to generate significant sales volume so far.

"The PowerPC is doomed to failure if Apple is selling 95% of the systems," predicted Kimball Brown, an analyst at Dataquest, Inc., a market research firm in San Jose, Calif.

But PowerPC proponents said that as Motorola starts to sublicense the Mac OS, it is only a matter of time before these other vendors begin to deliver systems based on the Common Hardware Reference Platform. That platform supports multiple operating systems, including Sun Microsystems, Inc.'s Solaris, Novell, Inc.'s NetWare, IBM's AIX and Windows NT.

An open window

An even bigger boost for the PowerPC platform may come from NT, users and analysts said.

"NT is a very viable possibility for the PowerPC," said Pieter Hartsook, editor of "The Hartsook Letter," an industry newsletter in Alameda, Calif.

"If a core of vendors — [such as] Compaq, Gateway and HP — put muscle behind it, that could be very significant," Hartsook said.

Users agreed.

"Personally, I don't see Apple being able to increase [its] market share from now on. But they are not the only player in town," said Jamie Carr, president of Insync Corp. in Bethesda, Md., a software developer that uses a Windows NT-based PowerPC 604 system.

Stacking up

A look at the offerings from major chip vendors

Vendor	Chip	Operating systems supported	Customers
Intel	x86, Pentium Pro	DOS, Windows, Windows NT	Compaq, IBM, Dell and hundreds of others
Digital	Alpha	Digital Unix OpenVMS	Digital, Cray
Sun Microsystems	SPARC	Solaris Unix	Sun, ICL Fujitsu
Hewlett-Packard	PA-RISC	HP-UX Unix	HP, Convex
IBM, Motorola, Apple	PowerPC	Windows NT, Mac OS, AIX	IBM, Apple, Motorola
Silicon Graphics Mips Technologies, NEC	R series	Windows NT	SGI, Tandem, Siemens-Nixdorf, NEC

DIRECTIONS

Winning in the Network Computing Era

One thing is certain in this constantly changing, dynamic world of information technology. You had better be well informed if you expect to remain competitive.

It's imperative that you devise a strategic business plan based on the most reliable, insightful, and conclusive market data available today.

For 31 years, the leading executives in the industry have built on their success by attending International Data Corporation's Industry Briefing Session. In addition to providing IDC's world-renowned market data and analysis, this year Directions '96 will examine the ripple effect that the network computing era will have on every segment of the industry, providing concise opportunity analysis and actionable advice.

To register and for more information, call:

1-800-343-4952

Tuesday, March 5, 1996
Hynes Convention Center • Boston, MA

Thursday, March 21, 1996
Moscone Center • San Francisco, CA

IDC
International Data Corporation
5 Speen Street, Framingham, MA 01701
(508) 872-8200 Fax (508) 935-4789

AGENDA

MORNING SESSIONS - 9:00-12:15

- **Hype, Health, and Heartache in IT and Communications Markets**
  Vicki J. Brown, Senior Vice President
- **The Era of the Wired Consumer: Discontinuity, Opportunity, Success, and Failure**
  Frank Gens, Senior Vice President, Worldwide Research
- **The Internet's Impact on Corporate Computing**
  David Vellante, Senior Vice President, Systems, Software, & Storage
- **Technologies for the Wired Market**
  John Gantz, Senior Vice President, Personal Systems and Collaborative Computing

	Session A 1:15 - 1:55	Session B 2:00 - 2:40	Session C 3:00 - 3:40
TRACK 1	**Planet PC: The Global Market Perspective** Bruce Stephen	**Home Computing: Fitting and Creating Demand** Richard Zwetchkenbaum	**Mobile Computing and Communications in the Connected Age** Randy Giusto • Michael French • Iain Gillott
TRACK 2	**Cyberbucks: Mass Market Retailing** Gigi Wang	**Application Hosting in the Cyber Millennium** Mark Winther • Michael Sullivan-Trainor	**CyberAge LANs** Lee Doyle
TRACK 3	**Systems & Server Market Dynamics** Jay Bretzmann	**Will Intel Own the Workstation Business?** Dr. Thomas Copeland	**Internet Servers of the 21st Century** Susan Frankle • Mark Winther
TRACK 4	**Opportunity in Networked Software** Dr. Anthony Picardi	**Where's the Leverage: Database or Applications?** Clare Gillan • Dan Kusnetzky	**Can Netscape Break Microsoft's Stranglehold?** David Card
TRACK 5	**Developing Channel Partnerships for Superior Service Delivery** Traci Bair	**Marketing Desktop Services: Hidden Costs No Longer Hidden** Kurt Johnson	**Distribution in the Era of the Electronic Marketplace** To Be Announced
TRACK 6	**Worldwide IT Market Outlook** Philippe de Marcillac	**Network Computing Challenges in Latin America** Paul J. Pastrone	**IT Market Restructuring in the Asia/Pacific Region** Davis Blair

CLOSING SESSION - 3:55 - 4:40

- **Industry Call-To-Action**
  Dr. Robert Metcalfe, Vice President of Technology, IDG; Inventor of Ethernet

Sponsored by: IDC NetworkWorld INFO WORLD COMPUTERWORLD PC WORLD

The rush to do business on the Internet is on. The question is, what will ultimately separate the winners from the losers?

A deciding factor will be your alliance with strategic network partners. Alliances that can help you capitalize on all the power the Internet has to offer. And when it comes to the Internet, there is no better partner than the people of Cisco Systems.

We didn't just arrive on the information highway yesterday. In fact, we're one of the pioneers who helped create the Internet.

Almost every message that travels over the Internet moves through Cisco equipment. And our Cisco IOS™ software is the core technology that empowers different hardware devices on the Internet to communicate with each other regardless

THE INFORMATION HIGHWAY IS PAVED WITH RHETORIC, METAPHORS, AND THE SCAR TISSUE OF MISINFORMED EXECUTIVES.

of their make or brand name, ensuring smooth, secure communications whether they're going around the corner or the globe.

All of this makes us uniquely able to help you build the type of infrastructure your company needs to employ the Internet for marketing, customer support and most importantly, more sales.

The metaphors, rhetoric and promises will only carry you so far. In the end, experience and expertise will surely take you much farther down the road.

So visit us on the Web at www.cisco.com. Or give us a call at 1-800-859-2726, ext. 159. We'll help to ensure that your company's trip on the Internet is a safe and profitable journey.

CISCO SYSTEMS
THE NETWORK WORKS.
NO EXCUSES.

From outside the United States, phone Cisco USA 408-526-7209, Cisco Europe 32-2-778-4242 or Cisco Australia 61-2-9935-4107.

Editorial

Defending limits

Censorship to a journalist is like speed limits to a driver on the autobahn: an outrageous government intrusion on the right to be free.

So why do I find myself fundamentally agreeing with the restrictions on indecency contained in the Communications Decency Act? Because the computer industry has painted itself into a corner, and legislation may be the only way to gracefully find a way out.

In the interest of selling more products to home users, the industry has lobbied for years to make a computer with a modem a necessity in every family room; kids who don't have one will miss out on their education, PC makers argue. Well, it's working. Nearly 40% of U.S. homes have PCs. But with the explosion in home computing comes the dark side of information access: Kids can dig in to the seamy side of the Internet with the same ease as visiting the Barney page.

As the parent of two young kids, I find this alarming. I can no more watch what they're doing every minute on-line than I can regulate what their classmates say on the playground. Someone has to be the mediator. And I doubt it's going to be the computer industry.

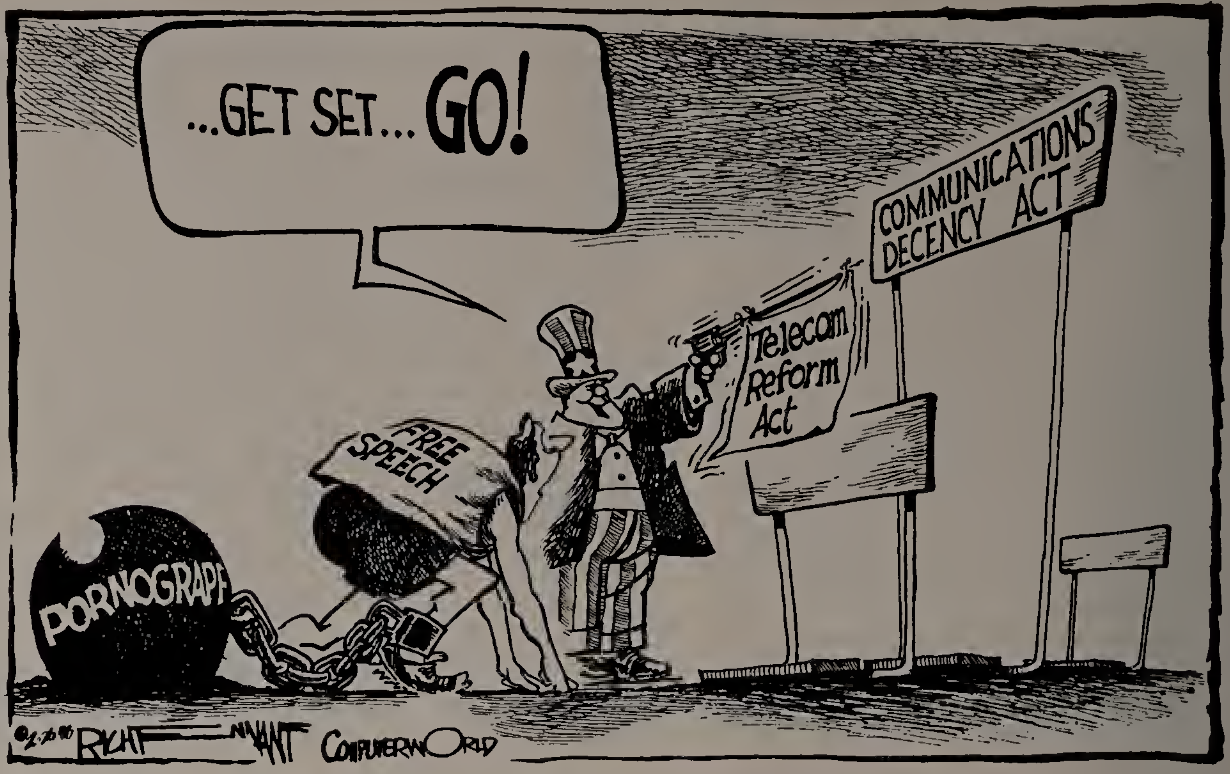
Ironically, few people argue against the laws that prohibit minors from buying skin magazines at the 7-11 or that make it a crime to make threatening or obscene telephone calls. What's so different about applying the same limits to downloading material from alt.sex.binaries or prosecuting nutcases who solicit sex from kids via E-mail? Free-speech advocates argue that the restrictions contained in the telecom law are too harsh and that the law can be interpreted to prohibit discussions of abortion or breast cancer. That may be true, but I doubt any reasonable judge would take the terms that literally. Most Americans are comfortable with letting the courts define what is obscene.

Ideally, on-line service providers would take the lead in regulating themselves. If bulletin board operators, service providers and academic institutions made a voluntary commitment to verify the identity of their users so that offensive material could be traced, the industry could take back the initiative from the government. But that's not going to happen in a business that's too busy growing to think much about self-regulation.

I'm no fan of government intrusion in our private lives. But telecom reform may be the only way to stave off a bigger backlash from parents who are increasingly alarmed about the dark side of universal access.

Paul Gillin

Paul Gillin, *Editor*
Internet: *paul_gillin@cw.com*
http://www.ultranet.com/~pgillin


...GET SET... GO!
COMMUNICATIONS DECENCY ACT
Telecom Reform Act
FREE SPEECH
PORNOGRAPH
©2.26.96 RICHARD TENNANT COMPUTERWORLD

Letters to the editor

Crypto restrictions aren't absolute

In Gary Anthes' article on encryption ["Standard encryption vulnerable to attack," CW, Feb. 12], he refers to the export restrictions that the U.S. government has imposed on certain encryption products.

The restrictions apply if the banking industry intended to sell those products. U.S. organizations can use these strong crypto products outside the U.S. as long as they get the proper license from the U.S. Department of State. This license also applies to U.S. individuals who travel abroad with encrypted files in their portable computers and to certain cellular telephone instruments.

Another approach would be to buy the necessary crypto product from a foreign supplier. A survey completed in mid-1995 identified more than 300 crypto products available in 35 countries; more than half used the Data Encryption Standard.

Edwin B. Heinlein
Avcoin Products & Services, Inc.
San Francisco

Don't forget OS/2

Regarding "No easy decision on Win 95 vs. NT" [CW, Feb. 5], there has been an easy choice for a number of years now. It's called OS/2. It is free of any concerns about flavors, migration or direction. It seems sad that, in a world in which "open" was a means to salvation, you should emphasize accounts in which "closed" seems a dominant principle.

It is a pity that your perspective lacks the breadth of your readership's experience. Would that only you could grow so that we could mutually benefit.

Lynn H. Maxson
TertiaLink, Inc.
Aliso Viejo, Calif.
lmaxson@ibm.net

Hooked on Java?

I just read the article concerning Sun's new line of Java chips [News Shorts, CW, Feb. 5]. Frankly, I don't see the problem.

The language has been out for some time and has already proved itself a good cross-platform system. Why does the introduction of a set of chips to optimize Java's behavior suddenly make it proprietary? Do others feel that Sun is going to get people "hooked" on Java and then change it so it works only on their chip set? Since Sun has already agreed to license the language, that seems unlikely. It is perfectly reasonable for Sun to try to optimize its systems to run the language it created. It's created a good thing; now let [Sun] make it even better.

Eddie Sheffield Jr.
Sheffield Computer Consulting
Glade Spring, Va.
esheffield@naxs.com

Add Apple to the 'human touch' list

"See me, feel me, touch me, heal me" [CW, Feb. 5] says that vendors such as Intuit, Microsoft, Sun and AST are attempting to make computing a lot more human.

Uhhh ... and Apple! It's not dead yet! Considering the role that some of the named vendors played in making the interfaces so inhuman in the first place, it's an awfully irresponsible bit of journalism to not mention Apple.

Also notably absent from mention was General Magic, which of course was spawned by former Apple executives.

Please take a moment to correct your thinking.

Keith Gardner
J. Crew, Inc.
New York
keithg@bway.net

Those year changes are so confusing

Your "official vaporware list" [CW, Jan. 22] has Apple's Copland as being vapor for 20 months. Yet on page 24, you note that Copland was announced last May, which would make it vapor for only eight months.

Since your list was based on announcement dates, isn't the eight-month figure correct? Or has the year 2000 confusion run rampant on your calculations?

Dan Kittay
Albany, N.Y.
DKittay@aol.com

■ Computerworld welcomes comments from its readers. Letters should not exceed 200 words and should be addressed to Paul Gillin, Editor, Computerworld, PO Box 9171, 500 Old Connecticut Path, Framingham, Mass. 01701. Fax number: (508) 875-8931; Internet: letters@cw.com. Please include an address and phone number for verification.

Michael Cohn

One pitfall of data mining: Data 'mine'-ing

This is getting ridiculous. You don't want it. You don't need it. Data warehousing is a hoax! When someone starts slinging stuff about enterprise modeling and data visualization, run the other way.

Sure, I've read all the come-ons: "Use data as a competitive asset," the vendors and consultants say. "Turn information 'islands' into business intelligence. Drill down. Tie together." Hogwash!

We've had data for decades. Mainframes have spit out more reports, numbers and pounds of paper than you can shake a stick at. No one's disappointed. No one's complaining. Folks have more greenbar printouts on their desks than they have time to read. They don't need more data. Build a data warehouse? I'd turn back if I were you, for the following reasons:

Obstacles. First, if you think folks will share their data, you're kidding yourself. The first obstacle you'll face is pathetically possessive users — those who suffer from data *mine*-ing. Second, warehousing is logistically complex. You've probably got data hiding all over the place. Leave it alone; it wasn't bothering anybody. Poke at it, and you'll discover it's in different formats and on incompatible platforms. You'll find data updated in *real time*, while you access it in *near time* with queries that run for a *long time*.

Users won't share the data, which is in different formats anyway.

Then you've got to grapple with size. There are PDBs (parallel databases), VLDBs (very large databases) and the inevitable IWSTGSLDBs (it-wasn't-supposed-to-get-so-large databases). When you toss in terms such as on-line analytical processing, replication and hypercubed multidimensional databases, it's enough to make you want to hit the next buzzword-blurting consultant with a two-by-four.

Metadata. Who came up with this? Data about data? Give me a break. I've been in this business 15 years and never even used it to impress a user. Besides, users don't want metadata — they just want betta' data.

Not-so-hidden costs. The final straw is money. Don't scam your stockholders with visions of returns on investment and market intelligence. After you've acquired a data warehouse administrator, a decision-support application manager, an enterprise architect, user-interface experts, a few dozen new servers and enough fiber and bandwidth to choke a horse, you'll likely join the legion of Fortune 1,000 companies that a) are implementing a data warehouse this year, and b) were a Fortune 500 company last year.

I don't want to sound like a cynic. Maybe you can pull it off. You might get the thing to work in a year or six. Submit a query — and then watch the lights dim for several city blocks as your data warehouse pounds through the stuff. It will miraculously tell you that the customers who buy three-ring binders also tend to buy those little plastic things that say "this side to sheets." Eureka.

There may be a salesman or two who finds fault with this analysis, arguing that you need a data warehouse — it's "strategic" — please sign here. But don't do it. We've survived with flat files. We've done just fine with ISAM, VSAM and, push come to shove, an RDBMS or two. But stay away from data warehousing. There are a thousand reasons why you don't need it. I just wish someone would come up with an easy way to drill down and find them all.

Cohn works for a large computer company in Atlanta. He's still convinced Unix is just a fad.

Michael D. Lips

You're working Feb. 29; are your systems?

Shortly after Feb. 29, 1988, a supermarket was fined $1,000 for having meat around one day too long. The problem was traced to a computer program that didn't adjust for the leap year.

Peter G. Neumann's book *Computer-Related Risks* cites this and other anecdotes from the Leap Year Hall of Shame, including computer systems from around the world that crashed in 1992. Sometimes the problems didn't even show up until year's end, such as a network of automated teller machines that crashed at midnight Dec. 31, 1992.

These may seem like quaint stories of leap-days gone by, but I predict a new wave of problems this year. That's right, 1996 is a leap year. By virtue of the "every-four-years" calendar rule taught in grade school, February has a 29th day. But this leap year is a piece of cake compared with the rapidly approaching year 2000, when two lesser-known calendar rules also kick in.

Here's the colorful tale of how a pope's calendar fixes may crash your system.

The original four-year rule was defined in 46 B.C. by Julius Caesar to adjust for the one-quarter day left over at the end of each year. An extra day was created every four years, thereby expanding the Julian Calendar from 365 to 366 days.

However, the length of the year isn't exactly 365.25 days but rather closer to 365.2422. By the 16th century, the resulting round-off error had accumulated to the point where the Roman Catholic Church became seriously concerned. Pope Gregory XIII was worried that religious holidays weren't being celebrated on exactly the right day. He commissioned an astronomer, Aloysius Lilius, and his brother to see how severe the problem had become. Their conclusion: The calendar was off by 10 days.

To correct the problem, Pope Gregory did two things. To eliminate future errors, he created two new leap-year rules — a 100-year rule that excludes century years and a 400-year rule that re-includes them. In other words, 1900 wasn't a leap year, 2000 will be and 2100 won't be.

Happy Leap Year! This is an easy one. Just wait until leap-day of the year 2000.

Then, Pope Gregory XIII decreed a "one-time correction" of 10 days. As a result, Thursday, Oct. 4, 1582, was followed by Friday, Oct. 15, 1582. All together, this is known as the Gregorian Calendar.

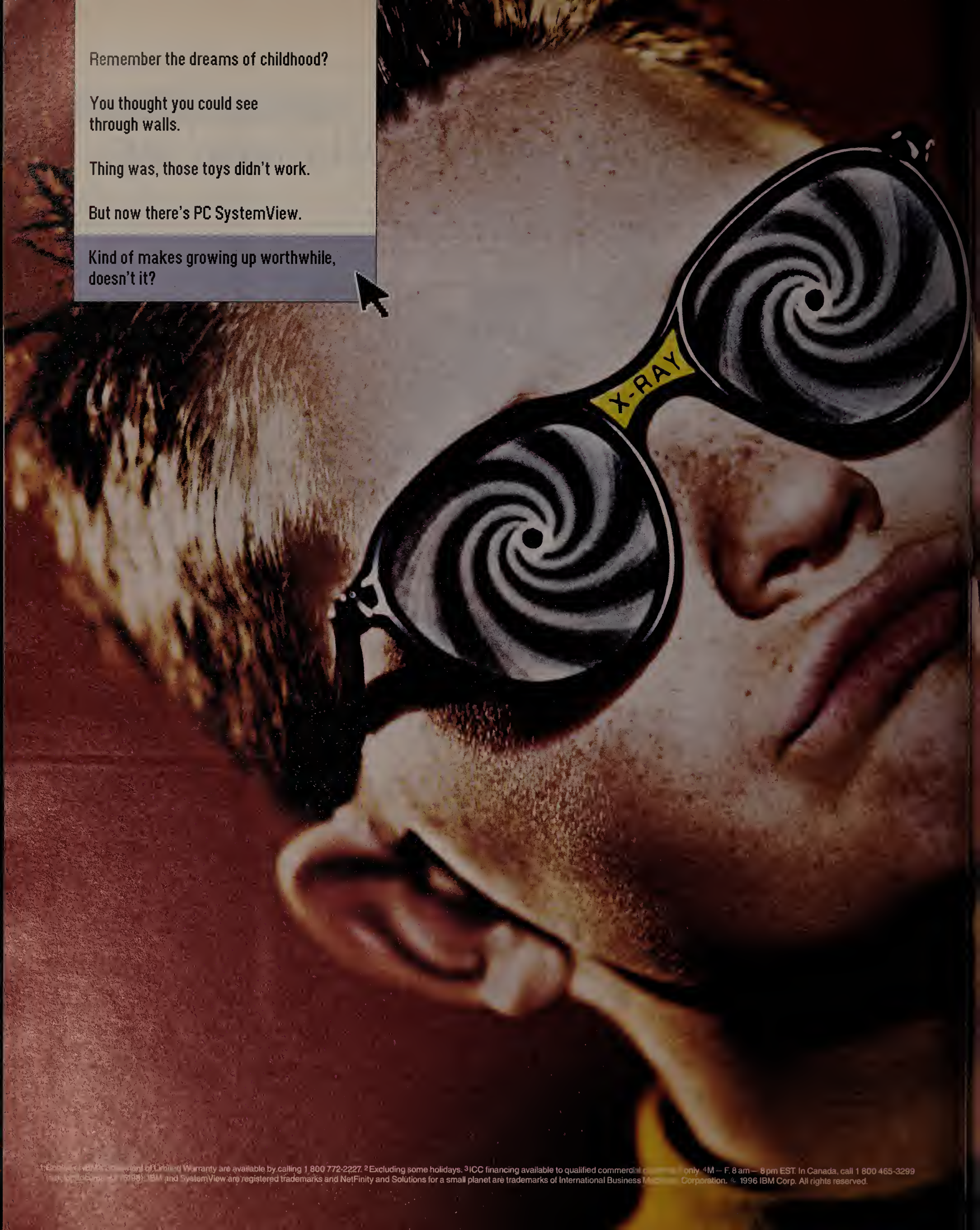
Naturally, not all countries adopted the standard at the same time. Great Britain and France reportedly spent years meeting each other, in battle, on unplanned and inopportune occasions. When Great Britain finally got around to adopting the standard in 1752, 11 days of error had accumulated (which explains why some reports said George Washington was born Feb. 11 and others said he was born Feb. 22).

Now, Feb. 29, 1996 is only three days away, and it's likely that many companies will experience at least one leap-year glitch. If we can't handle simple date logic every four years, how can we expect to handle more complex logic in the year 2000, when all three leap-year rules come into play? Some programs only implement the four-year and 100-year rules and therefore won't recognize 2000 as a leap year. Other programs won't even bother looking because they check only for the hard-coded values of 88, 92 and 96, and not 00. Still, others will properly recognize 2000 as a leap year but will improperly assign February a very generous 30 days.

Of course, this is small potatoes compared with the well-known "year 2000 problem," which involves programs that interpret 00 as 1900. Our systems are riddled with a variety of faulty date logic of all sorts — and much of it is going to get stress-tested in production in the next few years.

Because faulty calculations put our critical business systems at grave risk, we must always try to implement the best date logic possible. Date logic is the foundation on which many of our business systems are built. If we don't lay the foundation carefully, the systems may collapse. And I doubt that we'll get bailed out by papal decree.

Lips is president of TransCentury Data Systems in San Francisco.


Remember the dreams of childhood?
You thought you could see through walls.
Thing was, those toys didn't work.
But now there's PC SystemView.
Kind of makes growing up worthwhile, doesn't it?
X-RAY

[1] [illegible] of Limited Warranty are available by calling 1 800 772-2227. [2] Excluding some holidays. [3] ICC financing available to qualified commercial [illegible] only. [4] M – F, 8 am – 8 pm EST. In Canada, call 1 800 465-3299 [illegible] 1996). IBM and SystemView are registered trademarks and NetFinity and Solutions for a small planet are trademarks of International Business [illegible] Corporation. © 1996 IBM Corp. All rights reserved.

IBM PCs and PC Servers with PC SystemView®

3-year warranty[1] • Toll-free, 7-day, 24-hour support[2]

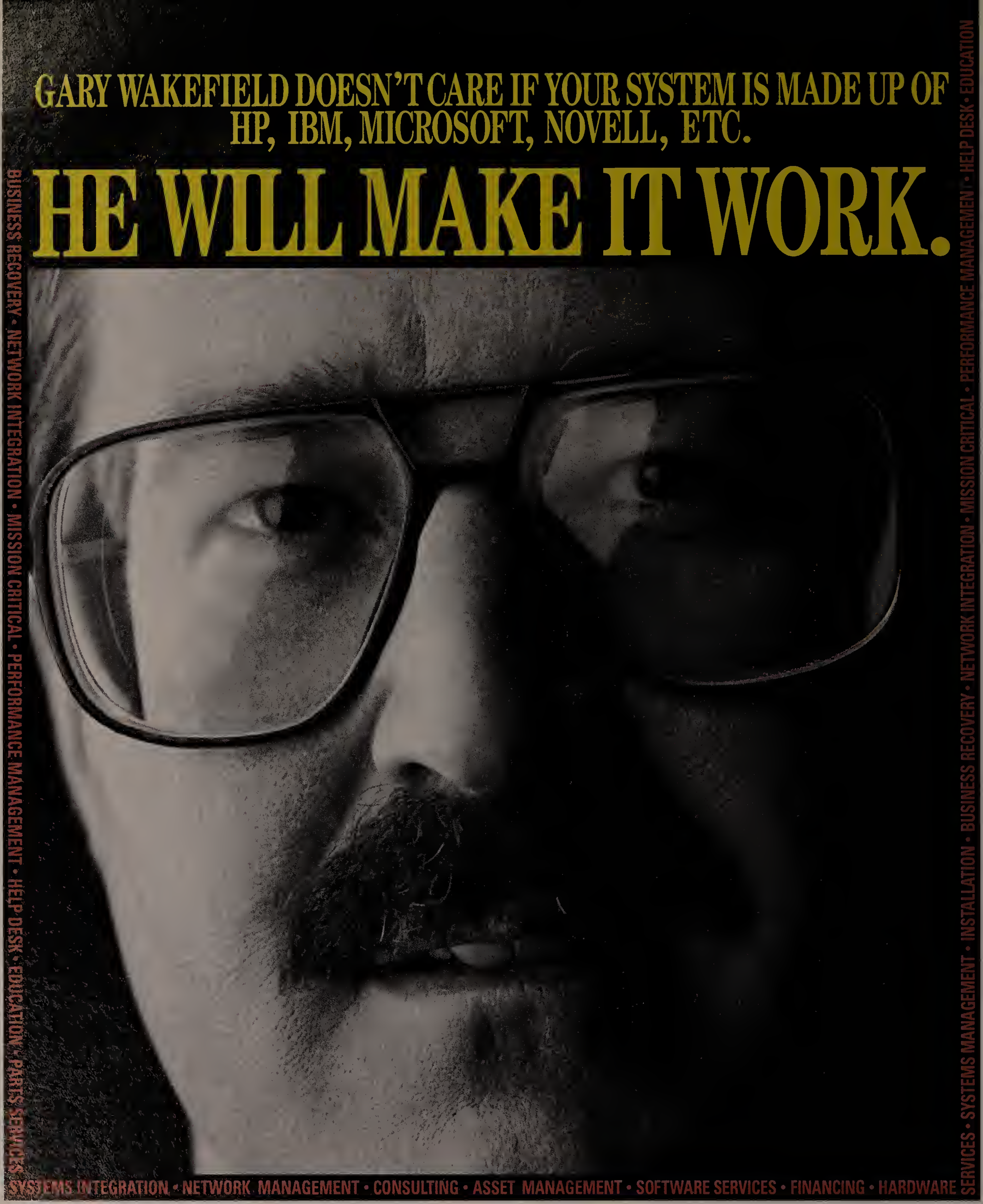
5.9% financing now available[3]

[Can your computer do this?]

IBM PCs and PC Servers and their built-in PC SystemView software (a.k.a. NetFinity™) give you the IS version of X-ray vision. You can inventory all your PC assets on screen – you can check memory, software configurations, disk capacity – right from your desk. And, PC SystemView comes with the ability to predict the future – it will alert you when disk failure is still just a possibility, so you can take action before problems actually become problems. PC SystemView will help you manage your PCs better – whether they're made by IBM or anyone else. Call 1 800 426-7161[4] for more information or visit our Web site: http://www.pc.ibm.com.

IBM®

Solutions for a small planet™


GARY WAKEFIELD DOESN'T CARE IF YOUR SYSTEM IS MADE UP OF HP, IBM, MICROSOFT, NOVELL, ETC.
HE WILL MAKE IT WORK.
BUSINESS RECOVERY • NETWORK INTEGRATION • MISSION CRITICAL • PERFORMANCE MANAGEMENT • HELP DESK • EDUCATION • PARTS SERVICES
SYSTEMS INTEGRATION • NETWORK MANAGEMENT • CONSULTING • ASSET MANAGEMENT • SOFTWARE SERVICES • FINANCING • HARDWARE SERVICES
SERVICES • SYSTEMS MANAGEMENT • INSTALLATION • BUSINESS RECOVERY • NETWORK INTEGRATION • MISSION CRITICAL • PERFORMANCE MANAGEMEN • HELP DESK • EDUCATION

Gary Wakefield - Global Support Account Manager

He's one of over 17,500 HP service specialists worldwide. And even if your computing environment consists of different hardware, software and networks, Gary and his team are there to take care of it.

Choosing just the right services is critical. That's why HP Service and Support is designed entirely around your system, rather than around our hardware. For more information, fax us at 1-800-437-9142, or visit our Web site at http://www.hp.com/go/4service.

HP works on your side.

HEWLETT® PACKARD

Microsoft is a U.S. registered
trademark of Microsoft Corporation.
©1996 Hewlett-Packard Company

Software will help users diagnose and resolve common PC hardware and software problems, 44

DLT faces Mammoth competition on servers

By Bob Francis

To help back up PC data, systems administrators are turning to digital linear tape (DLT), a technology that originally was developed for minicomputers.

For companies that are moving vital applications to large PC servers, DLT lets systems managers back up their data quickly and on a reliable medium. Most users rely on digital audio tape (DAT) drives for their smaller PC servers and large desktop systems. DAT drives often are slower and have less capacity — about 4G bytes per tape — when compared with DLT, which has at least 20G bytes per cartridge.

Tape backup

DLT was developed by Digital Equipment Corp. in Maynard, Mass., for its minicomputers.

"We went with DLT as the amount of data increased on our PC servers. It was a proven technology on minicomputer platforms, and we needed something reliable," said David Blanchard, a systems analyst at Quaker Oats Co. in Chicago.

PC server powerhouse Compaq Computer Corp. last month boosted DLT's legitimacy on the PC server platform when it announced a DLT tape array that offers more than 210G bytes of storage and software that will let data backups be completed in less than five hours.

Analysts said Compaq's move to DLT was just a matter of time. "Compaq is only doing what's becoming obvious, which is how big and how important these PC server applications have become," said John Dunkle, president of Workgroup Strategic Services, Inc. in Portsmouth, N.H.

Shipments increase

IDC projects shipments of DLT systems for PC servers will increase to 39,500 this year, up from 26,400 last year.

DLT may be challenged by a new 8mm tape-drive technology that will hit the market next month. Exabyte Corp. in Boulder, Colo., will release Mammoth, a high-performance drive that offers 20G bytes of capacity with a sustained throughput of 3M byte/sec. Both features are equal to DLT technology.

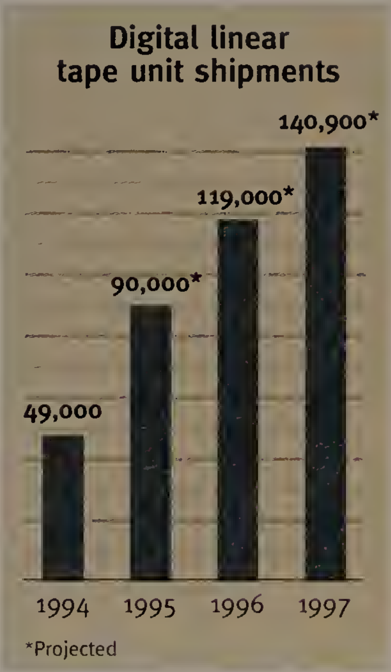
DLT uses a linear recording system and a precise tape guide to record data on the tapes. Exabyte's Mammoth drive uses a helical scan recording system.

Mammoth will face a stiff climb, according to Stan Corker, an analyst at International Data Corp. (IDC) in Framingham, Mass. "The biggest problem is that DLT has become so established as a backup technology for PC servers," he said.

Mammoth may have one payoff for users: Exabyte and Quantum Corp. in Milpitas, Calif., are expected to compete on tape-drive pricing. Pricing for the Mammoth drive hasn't been set. DLT drives currently cost a little more than $2,000. Quantum acquired the DLT technology from Digital in 1994 and this year, plans to increase that capacity to 30G bytes.

DLT's increased capacity is a strong selling point, but another factor in the product's success is backup speed, which is now at 3M byte/sec. This is considerably higher than the speed of current 8mm tape drives, DLT's strongest competition.

Besides Compaq, several other companies have licensed DLT, including NetFrame Systems, Inc. and Storage Dimensions, Inc., both in Milpitas, Calif. Storage Dimensions earlier this month at UniForum '96 announced the DLT4700, which is a 280G-byte DLT library.



Source: International Data Corp., Framingham, Mass.

Chips, MIPS, clips under the 'Big Top'

Culling the real news from the carnival-like hype of San Francisco trade show

By Craig Stedman

Magicians (Unisys Corp.), comedy improvisation troupes (SCO, Inc.) and transparently insincere hucksters (IBM) were out in full force at UniForum '96 this month in San Francisco. But amidst all the hokey trade show trappings, some actual news was announced.

This year, for sure

IBM said a long-promised upgrade of its PowerPC 604 chip should ship this summer for the multiprocessor versions of its RS/6000 servers. The 604, which was supposed to be available on those machines last year, can run up to 30% faster than the PowerPC 601 chip the company currently uses. Users are owed free upgrades to the 604; they should start seeing those in the second quarter, said Jeff Mason, vice president of worldwide marketing at IBM's RS/6000 Division. Volume shipments of 604-based systems should follow in the third quarter.

UniForum'96

Wait and see

Hewlett-Packard Co. in March will announce plans for a second-quarter release of servers that are based on its new 64-bit PA-8000 microprocessor. But HP won't commit to a specific shipment date until it sees what archrival **Sun Microsystems, Inc.** has up its 64-bit sleeve a month later. Sun in mid-April will introduce servers that are built around its 64-bit UltraSPARC chip, which is already available in workstations.

New IBM hybrid

IBM in the second quarter will ship a hybrid system that bundles a CMOS-based mainframe processor board into its low-end RS/6000 C20 server. The R390 is targeted at application development and at off-loading small mainframe workloads from old big-iron boxes. IBM shipped a similar hybrid based on a PC server a year ago.

Unix unification?

NEC Corp. and most other supporters of **Silicon Graphics, Inc.**'s MIPS architecture announced plans to embrace the 64-bit Unix that HP and SCO will deliver in 1998. But SGI isn't joining the porting party now. SGI's higher-volume and technical focus makes standardizing on a single Unix less crucial than it is for other MIPS vendors, NEC officials said.

Elvis fans

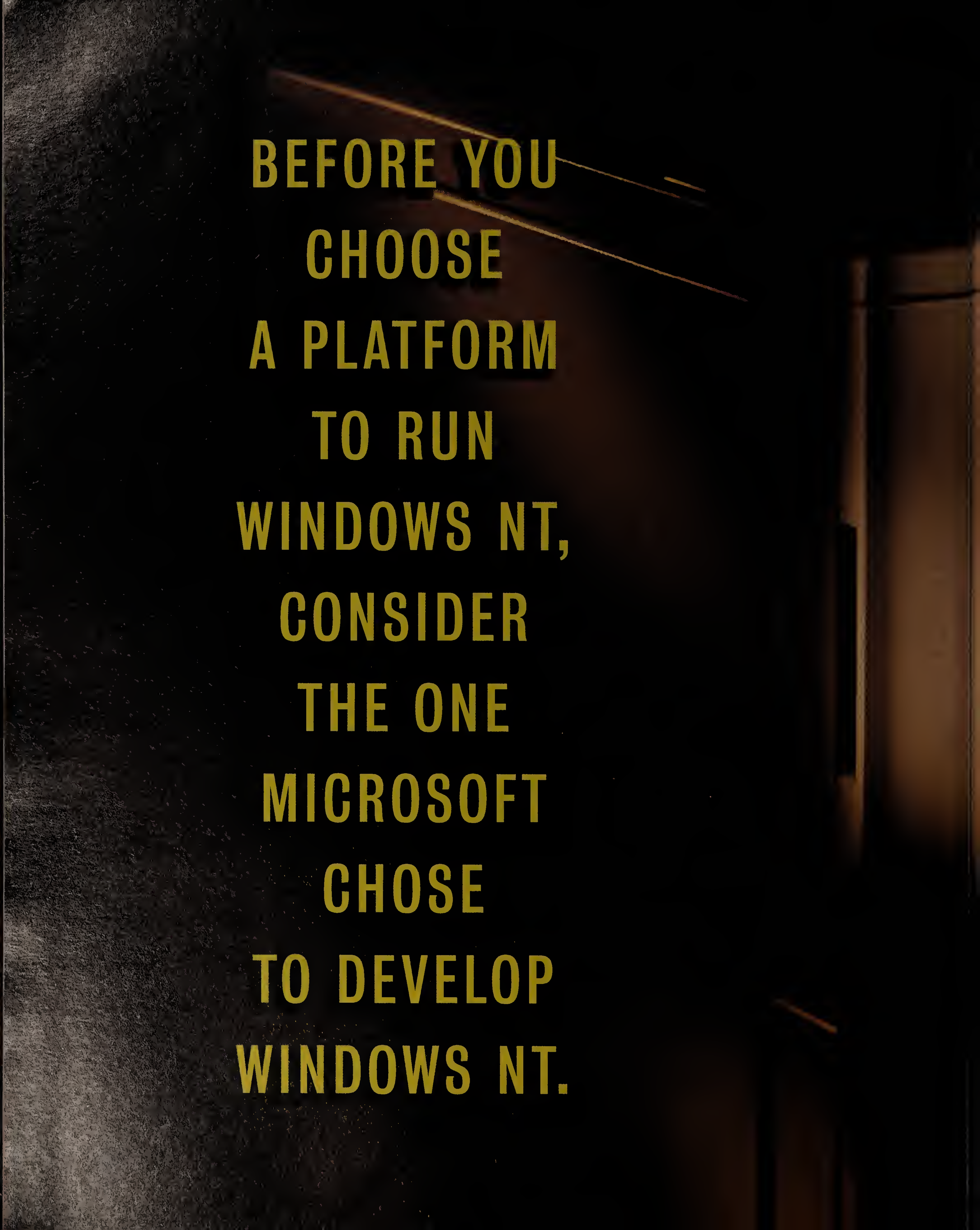
UniForum must harbor some Elvis Costello fans. Songs by the bilious Brit blasted over the sound system after keynotes by IBM's Lou Gerstner and Sun's Scott McNealy. The choice after Gerstner's talk was a bit curious: "Oliver's Army," a song about British mercenaries with the lyrics, "I would rather be anywhere else but here today." McNealy's speech was followed by the more apropos "Pump It Up."

Taking shots

The specter of Windows NT haunted UniForum, and a lot of shots were fired at Microsoft Corp. in an effort to stake out the open systems high ground. For example, Gerstner apologized for IBM's days as a bastion of proprietary systems. "But it turns out we're not the last bastion left," he said in a pointed reference toward Microsoft. McNealy described NT as "freedom from choice," and UniForum president Michael Tilson said the organization welcomes technologies that support open systems standards, "be they mainframes or Microsoft." Feeling heat from Redmond, guys?

Video stars

More keynote hijinks: After greeting his "fellow Unix lovers," HP's Lew Platt was interrupted briefly by a heckler from a janitors' union. McNealy's introduction was in the form of a music video; he and other Sun executives cavorted on a rooftop in leather and sunglasses while an homage to Sun blasted away to the tune of Stevie Wonder's "Higher Ground." The highlight came when the executives kicked some SGI boxes off the roof.


BEFORE YOU
CHOOSE
A PLATFORM
TO RUN
WINDOWS NT,
CONSIDER
THE ONE
MICROSOFT
CHOSE
TO DEVELOP
WINDOWS NT.

Nothing can match the performance and sheer power of MIPS/RISC.™ Which is precisely why Microsoft® chose it to develop Windows NT.™

And it's precisely why you should choose an NEC RISC system to run Windows NT. Our systems were used in every stage of development of Windows NT (in fact, they're still being used by Microsoft today).

MICROSOFT.
WINDOWS NT.

MIPS RISC CERTIFIED POWER

What's more, they're designed to do one and only one thing: to get the very most out of NT. And to do it at an affordable price. So if you're interested in the kind of performance Microsoft demands, there's really only one choice. The NEC RISC system.

To learn more, call 1-800-709-3434 or you can reach us on the Internet at http://www.nec.com.

SEE, HEAR AND FEEL THE DIFFERENCE.™

NEC

For information via fax, call NEC FastFacts™ at 1 800-366-0476 RISCserver, RISCstation and See, Hear and Feel the Difference are trademarks of NEC Technologies, Inc Microsoft is a registered trademark and Windows NT is a trademark of Microsoft Corp. All other trademarks and registered trademarks are the property of their respective owners. ©1995 NEC Technologies, Inc

Key #19750

HP uses X terminals to enter 'net market

By Michael Goldberg

X terminals may be the hatchbacks of the desktop. Only now, Hewlett-Packard Co. has installed mag wheels and chrome trim for users looking to cruise down Internet Strip.

HP is offering multimedia versions of its Envisex and Entria lines, with color monitors up to 20 inches wide, MPEG video cards and audio capabilities. HP seeks to recast its X terminals to compete in the still-nascent market of Internet access stations.

The machines are aimed at corporate users and can access Unix and legacy applications.

The X terminals use Intel Corp.'s I960 processors and cost from $2,000 to $5,400. Observers said these terminals are generally less expensive and easier to manage than PCs on a LAN because they don't contain the disk storage for applications software or the processing power of regular PCs.

With network connections to the HP 500 Windows application server, the Envisex, for technical users, and the Entria, for commercial sites, also access Windows applications. Internet access comes through a server that is fitted with the proper software.

Analysts praised HP's efforts as a savvy way to reposition an older product with new Internet-ready features. But observers cautioned that the market for "thin clients" is potentially exciting but still uncharted. For example, no one knows whether Sun Microsystems, Inc.'s planned $500 Internet device will launch a computing model or whether a consumer electronics product such as Sony, Inc.'s Playstation is better suited to lead the way.

Hot item

"You're going to see a tsunami of activity here for a device that is far less complex than a stand-alone PC that you'd use to run your applications," said Greg Blatnick, vice president at Zona Research, Inc. in Mountain View, Calif. He said the demand for this kind of technology could make X terminals an important alternative because "with the impact of the Internet or intranet, [end users] don't know where information resides, and they don't care."

User reaction shows that HP has some work to do to convince X terminal sites that they need multimedia displays and World Wide Web access at desktops that run Unix applications.

Potential Internet access from X terminals "doesn't have anything to do with us," said Shelley Miles, president of USAnimation, Inc. in Los Angeles. The firm makes digital animation applications.

But Vish Bhat at Pratt & Whitney Canada, Inc. in Montreal, said his engineering firm's plans to build intranet connections would make him look at the revved-up Envisex models.

"It would certainly be useful. Our drawings and internal documents could be done faster. We'd have to look at the cost," Bhat said. He is head of computational fluid dynamics at an engineering group that uses 600 Unix workstations and 300 X terminals.

From X to Sun

Along with its refreshed X terminals, HP is marketing systems management software called Enware. One of Enware's new features provides X terminal access to Sun servers.

Five types of devices are expected to provide access to the Internet and the Web:

1. General purpose PCs
2. Internet PCs – the heralded "$500 Internet appliance"
3. Internet terminals such as X terminals geared up with multimedia capabilities
4. Handheld devices such as the Sony Playstation
5. Set-top boxes, like the ones for cable television, to make TVs Internet-accessible

Source: International Data Corp., Framingham, Mass.

Help desk in a box for Win 95, NT

Artificial intelligence engine helps diagnose, solve problems

By Jaikumar Vijayan

A new product will give PC users an onboard help desk.

SystemSoft Corp., a Natick, Mass.-based vendor of system-level software, is developing a Windows 95 and Windows NT-based package that can automatically identify, diagnose and resolve common PC hardware, software and system configuration problems.

Users of PCs equipped with the software will be able to automatically solve problems, such as a sound card configuration issue or a General Protection Fault, without help from technical support staff.

"It is a terrific idea. It's the kind of thing that a lot of users are looking for," said Chad Pearce, vice president of systems at Godwins Booke & Dickenson, an accounting firm in Philadelphia.

SystemSoft's Call Avoidance software will be licensed to hardware OEMs for bundling with their systems. It is being developed with funding from Digital Equipment Corp. and Intel Corp.

"This really represents the wave of the future in terms of how people will get the support they need," said Robert Johnson, an analyst at Dataquest, Inc. in Westboro, Mass.

Reaching a new level

Other tools have done what Call Avoidance will do, Johnson said, but "what SystemSoft is attempting to do is new to the industry in terms of scope and scale."

Call Avoidance is an integrated package that contains a wide knowledge base of general and system-specific hardware problems — and resolutions to those problems — culled from Digital's multivendor customer support group.

Built in to the package is an artificial intelligence engine that determines the cause of a specific problem and resolves it. The software takes advantage of system data available through Windows 95 or NT registries, the Plug and Play BIOS and other system data files to help diagnose and resolve problems.

The product is expected to be released in the second quarter, and PCs incorporating the package are likely to ship by year's end, according to SystemSoft officials.

An example of how Call Avoidance software works

The problem

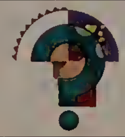
You've just installed a popular DOS game on your new PC. The background music works fine when playing the game, but other sounds don't seem to work.

The fix

1. Call Avoidance automatically examines the system and determines there is a conflict with the port that the sound card needs to use.
2. The software reassigns the card to an open port and reloads the game.
3. Total time for the fix is under 2 minutes, according to SystemSoft.

Ask the 'net

Additional products being developed by SystemSoft will take advantage of the Internet. If a problem can't be resolved locally, the PC can automatically access and download much larger and updated knowledge bases from remote system vendor sites via the Internet.



1982

New Products

Advanced Software Products Group, Inc. has introduced Date/2000 2.0, a product for adapting IBM MVS applications for the year 2000 date change.

According to the Naples, Fla., company, the product scans sources for date-related data names and provides reports for each program.

Pricing starts at $8,900.

▶ *Advanced Software Products*
(941) 649-1548

TEAC America, Inc. has begun shipping the TEAC Tape800 and Tape1600 internal tape drives.

According to the Montebello, Calif., company, TEAC Tape800 uses Travan TR-1 minicartridge technology to achieve a compressed capacity of 800M bytes. The TEAC Tape1600 uses 2-to-1 compression of TR-2 tape cartridges to achieve a compressed capacity of 1.6G bytes, or 800M bytes uncompressed.

TEAC Tape800 costs $149. TEAC Tape1600 costs $179.

▶ *TEAC America*
(213) 726-0303

CreatePrint of America has introduced CreateFax 1.3, an integrated fax system that works with CreatePrint electronic forms software for IBM's AS/400.

According to the Canoga Park, Calif., company, CreateFax 1.3 lets users at AS/400 terminals send high-quality faxes, including purchase orders, invoices, quotations, and reports, anywhere in the world.

It was designed to monitor the output queue and merge data with selected forms. It monitors the status of a fax throughout the process and provides this information to any AS/400 terminal. It also can split a print file containing invoices or purchase orders into individual faxes.

Pricing for CreateFax 1.3 starts at $6,500.

▶ *CreatePrint of America*
(818) 992-4028

Micro Design International, Inc. has introduced SCSI Express Model SE2600S, a 2.6G-byte magneto optical drive.

According to the Winter Park, Fla., company, Model SE2600S offers expanded capacity with high performance and reliability. It complies with optical standards and provides backward compatibility with 1.3G-byte media and 650M-byte media. It was designed for desktop and networked environments.

Model SE2600S features fast disk rotation speed of 3,000 rpm, resulting in a sustained transfer rate of 1.7 to 3.4M byte/sec. It offers both rewritable and write-once-read-many technologies.

Pricing for SCSI Express SE2600S starts at $3,395.

▶ *Micro Design International*
(407) 677-8333

Is there ever a good time to upgrade your operating system?

Finding the perfect time to migrate
is like finding the perfect time to mow the lawn.
However, finding the perfect reason is easy: value.
Upgrades have value insofar as they deliver dramatic improvements,
improvements that outweigh the cost of deployment.
With the Microsoft® Windows® 95 operating system,
that value is demonstrable. And in what follows, we'll show you how it,
and the 32-bit applications that run on it, can reduce your support burden,
increase your control over the desktop,
and improve the productivity of end users.
In short, we'll address the issues that tend to forestall serious evaluation.
We'll even go so far as to suggest that waiting has costs of its own.

Support for IS.

Support for system administrators begins with support for end users. With its simplified interface, Windows 95 allows users to work far more independently than in the past. Simply put, the greater their autonomy, the less time you spend answering obvious questions.

But it's not just the interface that's improved; the whole system is more reliable. Thanks to the 32-bit protect-mode components of Windows 95, users can run multiple applications at the same time, without running out of system resources or freezing-up their PCs. The same is true even if a network server goes down. And, with 32-bit applications now able to run in their own memory space, the likelihood of one app crashing another is almost nil.

Today you can turn the desktop into the most tangible technology investment your company can make.

What's the upshot of all this? Well, it won't exactly turn you into the Maytag repairman, but it can cut helpdesk calls by 7 to 14% a year.[1]

Still, in designing a new OS, we realized that to make things easy for the end-user at the expense of the IS department would be self-defeating. And to that end, Windows 95 offers a variety of powerful tools to help you better manage your network and your time.

Built into Windows 95 are a number of tools to simplify administration. 32-bit versions of popular network clients, like Novell® NetWare® are included, as is support for standard transport protocols like TCP/IP and device standards. Plug and Play support detects hardware devices as they are added to the system, which makes installation a snap. And, with Server-based Setup and Batch Setup tools, it's now possible to install and configure Windows 95 on multiple desktops from a server. Automatically. Once you're wired, you can monitor performance and troubleshoot problems from a central location.

More support: more control.

System Policies in Windows 95 allow you to specify system settings and restrict network access and security privileges from a central location. So you can lock down desktop configurations whenever you see fit. And with User Profiles, individual users' desktop configurations are available wherever they log on to the network. This lets multiple users share one computer and "roving" users log on to other networked computers, while maintaining their own personal settings.

Again, with Windows 95, all of this can be done from a central location, reducing the number of on-site visits by 30 to 50%.[2] At last, you'll be able to focus on the big-picture stuff. So the next time someone asks you what's what with this Internet thing, you can say, *I have a plan.*

Productivity from the word *Start.*

The improved interface in Windows 95 makes nearly everything easier for novice and advanced users alike. Its Start button and task bar make applications more accessible. Long filenames make identifying files easier. Better tools such as Wizards and improved Help make learning features easy. Its right mouse button puts common commands a click away. And now that the separate Program Manager, File Manager, and Print Manager are gone, there are fewer concepts to learn. This makes for able, autonomous, and, dare we say, happy end users. People who require less training and support. Who, in short, can turn the desktop into the most tangible technology investment your company can make.

But Windows 95 isn't just easier, it's more responsive. Basic operations, like printing or accessing a file on a PC or over a network, are faster. And with its 32-bit multitasking capability, users can conduct file searches, online communications, or other tasks all while, say, editing a document. In fact, studies show that once users are familiar with the new OS, they're able to accomplish many tasks in about half the time it took under Windows 3.1.[3]

Of course, no one spends their entire day tooling around in their operating system. People have work to do. With that

---

[1] Technology Business Research, Inc., a market research firm, collected and analyzed the helpdesk logs of 10 Fortune 100 companies in order to project the impact of Windows 95 on call avoidance, problem resolution, and on-site call reduction. The logs represented 100,000 PC users and 1.5 million helpdesk calls per year. [2] Technology Business Research, Inc. [3] To quantify the learning curve from Windows 3.1 to Windows 95, and evaluate user productivity on Windows 95, Usability Sciences Corporation, an independent usability testing organization, had 75 beginner, intermediate, and advanced Windows 3.1 users complete tasks with both operating systems. They found that users were 91% more productive with Windows 95, and 94% more accurate. Tasks performed included: finding and opening files and programs, copying and moving files, and switching between active programs. [4] The MASIE Center, a recognized software training center and think-tank found that only one hour of briefing and

The prevailing wisdom and why, this time, you should ignore it.

Common sense tells you to hold off on making the move to Windows 95, to wait until someone else finds the bugs. Well, someone else already has. With the largest beta program in history, Windows 95 was installed on more than a million desktops worldwide. Now, just six months into its commercial release, thousands of organizations are in pilot and rollout. And to keep them current, we've put together an online Service Pack with the latest drivers and other new components. In short, the dreaded "1.0 version" has already come and gone.

in mind, no evaluation of Windows 95 would be complete without simultaneously evaluating some of the 32-bit applications designed for it, such as Microsoft Office for Windows 95.

Now users can focus on their work instead of their software.

Office 95 is more than just fresh features on top of Office 4.x. It's a deeply integrated suite of applications. Integrated, both with the operating system and with each other. Because users can leverage their knowledge of one application throughout the entire suite, they need only three hours of training to be effective in all of them.[4] Needless to say, this can dramatically reduce training costs.

But what about support? While it's one thing to get PC users up and running, it's quite another to teach them all the skills they'll ever need. And of course, you can't; users simply aren't interested. (Remember? They've got work to do.) Knowing this has made all the difference in designing Office 95. It's resulted in advances such as the Answer Wizard, which lets users ask the computer plain English questions like, *How do I print sideways?*, and then shows them exactly how to do it. As a result, you can expect a 48% reduction in Office-related help calls.[5]

With Office 95, users are not only able to work on their own, they're able to accomplish more things faster. Labor-saving features such as updated AutoFormat and Spell-It in Word, and enhanced AutoComplete in Microsoft Excel, not only render everyday tasks automatically, they do so accurately. According to Kelly Services, the folks who train and supply corporations with over 325,000 office professionals each year, users complete their tasks 37% faster with Office 95. And they're 36% more accurate in doing so.[6] Not a bad day at the office.

Why sooner is better than later.

If, as the headline says, there's never a good time to migrate, why make the move now? Why? Because deployment takes time. Product reviews, network configurations, lab tests, pilot programs, rollout — it takes time. And if the goal is to decide *Is it worth it?* and you continue to put off serious evaluation, it'll be that much longer before you begin to realize the productivity gains and cost savings that Windows 95 and Office 95 have to offer.

But let's assume you upgraded today. How long would it take to recoup your migration costs? According to a leading consulting firm, Office 95 will pay for itself in 10 months in medium-sized companies, and 12 months in large organizations.[7] Factor in the increase in end user productivity, and those numbers fall by nearly half.

No question about it, the move to 32-bits is a big one. But as part of the larger evolution in chip architecture, hardware platforms, and application support, it's not one that you or Microsoft is making alone. Won't you join us?

How to start.

To receive a free copy of Trial 95 — including guides for evaluation and deployment, resource kits, feature reviews, and, of course, copies of both Windows 95 and Office for Windows 95, each with a 90 day license — call (800) 583-0042, Dept. A017. Or visit our Web site at www.microsoft.com. All the backup for the studies cited here is included, along with an ROI modeling tool so you can plug in your own numbers.

Windows 95 or Windows NT™ Workstation? Yes.

Both products are strategic for your organization. Together they make it possible for you to deploy Win32®-based applications, reduce your support costs, and make your end-users more productive — across all your desktops. The right mix for your organization will depend on your business needs and constraints. For guidelines on how to pick the right mix, go to www.microsoft.com/windows/mix.

Microsoft®

WHERE DO YOU WANT TO GO TODAY?™

---

two hours of self-discovery were required to migrate Office 4.3 users to Office 95. **5.** Technology Business Research, Inc. **6.** Kelly Services, Inc. conducted a controlled usability study of 35 employees who regularly use Office 4.3. Participants were measured for speed and accuracy in completing commonly performed tasks. **7.** International Data Corporation modeled the expected returns on investment of Office 95 for large companies (1,000+ PCs) and for small-to-medium companies (100 PCs). On a cost-to-use basis, large companies will see their investment paid for in 12 months, small companies in 10. On a value-to-use basis, those figures drop substantially: 4.8 months for large companies, 5.3 months for small. © 1996 Microsoft Corporation. All rights reserved. Microsoft, Windows and Win32 are registered trademarks and Windows NT, the Windows Start logo, and *Where do you want to go today?* are trademarks of Microsoft. Novell and NetWare are registered trademarks of Novell, Inc.

Network can teach you a few new tricks.

Sun Educational Services. If you've ever wanted to make network computing work for your company, we can show you how. We teach more people about the UNIX® operating system and network computing than anyone else. In fact, we train over 50,000 customers around the world every year. And we're the only company entirely dedicated to enterprise network computing. So we're uniquely qualified to help your people make the right long-term decisions. Sun Educational Services. Part of the full range of business support offered by SunService. To learn more, contact us on the Internet at http://www.sun.com/sunservice/suned or call 1-800-422-8020. And start getting some answers right away.

©1995 Sun Microsystems Inc All rights reserved Sun Sun Microsystems, the Sun Logo, SunService, the SunService Logo and The Network Is The Computer are trademarks or registered trademarks or service marks of Sun Microsystems Inc in the United States and other countries UNIX is a registered trademark in the United States and other countries, exclusively licensed through X/Open Company, Ltd

SunService
THE NETWORK IS THE COMPUTER

Closer Look

A Closer Look: Unix, OS/2 hold their ground against NT, **54**

Client/server grows up and out

By Julia King

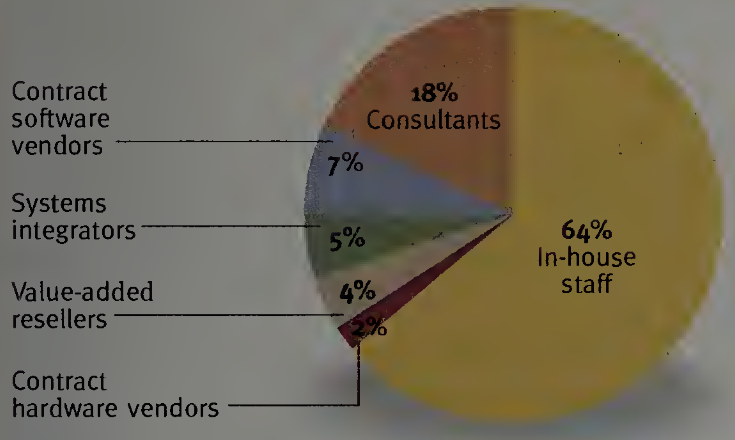
Start small and keep a low profile. Five years ago, that was state-of-the-art advice for companies that embarked on client/server projects.

Not anymore. Buoyed by increasingly sophisticated application packages and a wealth of new system development and network management tools, many organizations have decided that bigger is better.

Consider the following:

- The Department of Defense plans to manage personnel records for 800,000 civilian workers and another 1.2 million Air Force personnel by using Oracle Corp.'s human resources package. When it is completed in 1998, the system will encompass 1,000 servers, making it the largest client/server deployment in the Air Force.

Fortune 1,000 companies expect to deploy 230,000 new business-critical applications based on client/server between 1995 and 1997. A breakdown of who will actually do the work is as follows:



Base: 367 Fortune 1,000 companies

Source: The Standish Group International, Inc., Dennis, Mass.

- The Department of Veteran Affairs is implementing PeopleSoft, Inc.'s human resources package to track more than 250,000 employees at 230 locations nationwide.
- On the commercial front, large companies are basing global corporate stnadards on packaged applications. Recent examples include deployments at Alco Corp. in Pittsburgh and Kellogg Co. in Battle Creek, Mich. Both firms use Datalogix International, Inc.'s suite of manufacturing applications.

Half of everything

This year, large companies' client/server budgets will grow 28%. Overall, client/sever spending will make up 50% of all software spending, according to Sentry Market Research in Westboro, Mass.

Companies are also building large, custom client/server systems for mission-critical applicatons and often are completing much of the design and development work in-house, according to Sandy Taylor, a market analyst at The Standish Group International, Inc., a market research firm in Dennis, Mass. (see chart).

"[In] the next two years, 230,000 business-critical applications in North America" will be deployed, Taylor said. "The pioneering days are over." The 230,000 new applications will use a combination of packaged software and proprietary technology.

Package pull

What has changed most since 1990 is the number of client/server tools available and their broadened functionality, industry observers said.

"A few years back, we wouldn't have even considered a packaged application. They just weren't refined enough," said Jim Densberger, technical director of personnel data systems at the Defense Department.

Advances in graphical user interfaces and object-oriented icons, for example, make packaged software a viable alternative to developing systems from scratch. "Hewlett-Packard Co.'s OpenView is another example of a tool that just wasn't where we needed it to be five years ago," but today, it has functions such as advanced configuration management that make large-scale deployments feasible, Densberger said.

Once Internet-enabled applications now on the drawing board become available, large-scale client/server deployments also should become much cheaper, according to Brian Sommer, worldwide director of software intelligence at Andersen Consulting in Chicago.

Internet-enabled business application software — which is in the works at SAP AG, PeopleSoft and Oracle — can be accessed by users with a World Wide Web browser rather than a PC-based client that is laden down with a traditional application's access and presentation software.

"That means the cost to install the software on any desktop device would only be about $39," Sommer said.

Components may sour users on software suites

More vendors to offer mix-and-match wares

By Lisa Picarille

Applications

The availability of off-the-shelf, component-based software will increase during the next two years and should greatly affect how users purchase software, industry watchers expect.

The promise of component software is that all parts will work together seamlessly, no matter which vendor you buy them from. This would allow users to mix and match components, buying only the features they need, to create their own customized applications or suites of products.

For example, users could build their own word processor by buying a spell checker object from one vendor, a text editing component from another vendor and a chunk of code that generates only tables from yet another vendor.

Initially, these components will probably come from small vendors, industry watchers said. But eventually, the larger applications vendors will undoubtedly need to supply these pieces as well.

One user said he liked the idea of buying just the pieces he needs.

"I would prefer that my word processor and other applications get smaller but not lose the functionality," said Lee Stone, the de facto network administrator at Ace Industries, Inc., a Norcross, Ga., construction equipment company. "It's not a contradiction. I want applets or objects that I can buy on a per-use basis."

But the reality is that the only objects available right now are OCXs (objects based on Microsoft Corp.'s OLE) and a handful of OpenDoc parts.

This movement toward components may not be good news for vendors such as Microsoft or Lotus Development Corp., which make their money by selling suites, or integrated packages of productivity software (see chart, page 52).

Reeling them in

"First, they get users hooked on their word processor, and then they sell them an entire suite of products," said Nicole Miller, an analyst at International Data Corp., a market research firm in Mountain View, Calif.

For the vendors to sell components, they would have to break apart their suites of office applications, and this approach "just may burst the office bubble," said Chris Le Tocq, an analyst at Data-

Components, *page 52*

Top application software vendors worldwide by revenue

Snapshot

Vendor	1994	1995	1994 to 1995 growth rate	1995 market share
Microsoft	$1.7B	$2.5B	47.1%	6.2%
IBM	$1.6B	$1.7B	6.5%	4.3%
SAP AG	$843M	$1.3B	56.9%	3.3%
IBM/Lotus	$401M	$540M	34.6%	1.4%
Computer Associates*	$425M	$478M	12.5%	1.2%
Total market revenue	$34.9B	$40B	14.5%	–

*Includes revenue from Legent Corp.

All dollar amounts are rounded

Source: International Data Corp., Framingham, Mass.

Imagine changing a tire at over 200 miles an hour.

An unreasonable demand? If you're an IS manager, you face the equivalent every day. And tomorrow, you may be asked to replace the engine. Or change the transmission. And don't forget, your business can't slow down. Fortunately, there's ObjectStar,™ software that makes the impossible possible. ObjectStar allows you to replace, enhance or incrementally renew your business-critical applications. And quickly move or distribute them wherever they are needed.

From servers, to mainframes, to desktops. While you and your enterprise remain in the race. And, yes, there is a track record. Kemper National Insurance Companies, Marks & Spencer, EDS,® and Isuzu, to name just a few. For case histories, and your own test drive, please call us at 1-800-ANTARES. Let us show you how ObjectStar can help you keep your foot to the floor.

Welcome to ObjectStar

Antares
ALLIANCE GROUP

ObjectStar gives IS the most reasonable tool to meet the most unreasonable demands. ObjectStar supports MVS, HP-UX, IBM AIX, Sun Solaris, Windows, and Windows NT

©1996 Antares Alliance Group. Antares, Antares Alliance and ObjectStar are trademarks of Antares Alliance Group. EDS is a registered service mark of Electronic Data Systems Corporation. All other trademarks are the property of their respective owners.

Start-up rolls out multitier system

Offers tool for building high-end client/server apps

By Frank Hayes

Tool kits for building enterprise-class distributed systems have been difficult to use. A start-up hopes to change all that.

Most corporate information systems shops have built simple client/server applications using low-end tool sets such as PowerBuilder from Sybase, Inc.'s Powersoft subsidiary, Visual Basic from Microsoft Corp. and SQLWindows from Gupta Corp.

But building large-scale enterprise applications is something else again. Only a few large organizations are using development systems from vendors such as Forte Software, Inc. in Oakland, Calif., and Dynasty Technologies, Inc. in Naperville, Ill.

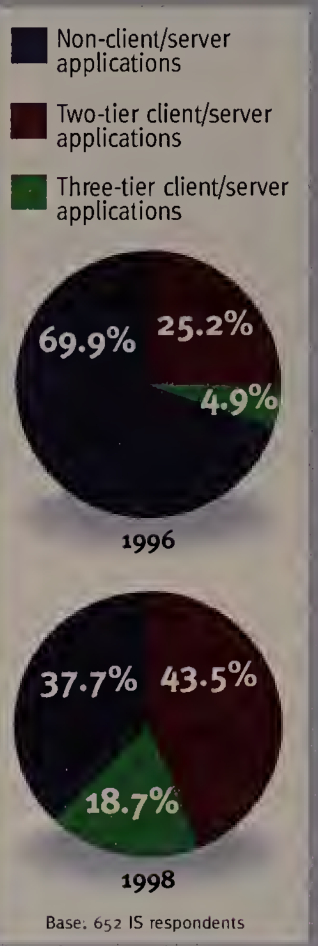
What's on tap

Hoping to make it easier for users to jump on the high-end client/server bandwagon, Nat Systems International, Inc. in McLean, Va., last week began shipping NatStar, a version of the company's client/server rapid development system for Windows, OS/2 and Unix.

The $8,500 system lets developers build multitier applications by writing only a minimum of code and configure those applications on the fly, users said.

Won't shed a tier

Corporate IS departments predict they will begin to implement three-tier applications over the next two years



Source: Strategic Focus, Milpitas, Calif.

"NatStar allows a user to specify a complete application using a class model but without defining the target platforms," said Patrick Castagna, who is responsible for platform engineering at Assurances Generales de France, a leading French insurance firm.

Developers use a series of visual tools to define data architectures and program flow. Then the application can be partitioned among client and server platforms, and NatStar automatically generates code and compiles it on each platform.

Unlike its rivals, NatStar also allows users to make minor changes to the application without recompiling it.

Although individual modules are compiled from C code, users can modify the program's logical flow between modules at runtime. The system can also be set up to locate and install any modules when the program is run. But only the flow of logic, not elements such as the data architecture, can be easily changed, Castagna said.

Nat, the U.S. unit of the French firm Nat Systemes in Paris, set up shop in the U.S. in November.

"The real issue with any of these tools is which one of these companies is going to be around next year," said Gregory Tyson, assistant vice president and director of technical architecture at The Equitable Cos. in New York. Nat, with over 300 customers using the system for transaction processing applications, seems a surer bet than Forte and Dynasty, whose users are just beginning to roll out production applications, he said. Equitable is a Nat user.

Components may sour users on suites

CONTINUED FROM PAGE 49

quest, Inc., a San Jose, Calif., market research firm.

Single-vendor virtues

But on the other hand, Stone wants the comfort of buying from a single vendor. "It gives me more confidence that the products are more likely to work together," he said.

But industry watchers said that once users realize these components really do work together, they will jump on the bandwagon.

"As organizations become more aware of what they actually need in terms of features and functionality, they will start to buy more intelligently and see the value of objects," Le Tocq predicted.

Suites market share

	1994	1995
Microsoft Office for Windows	62.3%	90%
Microsoft Office Professional for Windows	22.1%	NA
Lotus SmartSuite	14.3%	4.6%
Borland Office for Windows (Novell/ WordPerfect products)	0.3%	NA
Borland Office for Windows (Borland products)	0.1%	NA
Novell PerfectOffice	NA	5.4%
Total worldwide revenue	$1.7 billion	$2.9 billion

NA = Products not available

Source: Dataquest, Inc., San Jose, Calif.

A developer's resource list

Books

◆ *Visual Basic 4 Nuts and Bolts: For Experienced Programmers* by **Gary Cornell and Troy Strain; Osborne/McGraw-Hill, Berkeley, Calif.; 338 pages; $24.95.**

The book's title says it all: This is for professionals; don't try this at home. The reader doesn't necessarily have to know Visual Basic but does need to know the basics of programming to get maximum use from this book. The target reader is a programmer who wants to learn Visual Basic. Topics include designing a form, error handling, debugging, objects and OLE and advanced programming features.

◆ *Teach Yourself Visual Basic* by **Bob Albrecht and Karl Albrecht; Osborne/McGraw-Hill, Berkeley, Calif.; 512 pages; $24.95.**

Unlike the book above, this one is meant for beginners, including those who are new to any kind of Windows programming. Still, it isn't certain that someone who has never heard programming terms would be able to follow this book without guidance from a more experienced colleague. Chapters include exploring the Visual Basic environment; using forms and command buttons in simple projects, loops and switchbacks; using procedures, data arrays and variables; and using constants.

CD-ROMs

◆ *C & C++ Cyber Classroom*; **Prentice Hall, New York; $69.95.**

This training tool, based on college textbooks, is intended for programmers who want to teach themselves new skills as well as corporations that want to train a bunch of folks en masse.

It is an interactive CD-ROM, the developers claim, with four hours of audio, 4,000 hyperlinked index entries, more than 300 programs and 500 exercises with answers. Users can follow video instructions, hear audio clips and find warnings, tips and tricks.

—Johanna Ambrosio

Briefs

Blyth Software to put Omnis on OS/2

Blyth Software, Inc. in Foster City, Calif., will port its Omnis client/server development system to OS/2 by this summer as part of a deal with IBM. The agreement will also result in a PowerPC version of Omnis for OS/2 later this year. IBM and Blyth will jointly develop training, consulting and vertical market programs. Prices for the new versions of Omnis haven't been set.

Lotus offers help with project organization

Lotus Development Corp. will release the application programming interface for Organizer 2.1 to developers. This will let developers create applications that can pull information such as addresses or appointments out of the Personal Information Manager software. For example, project management software could extract task lists from Organizer without the user's reentering the information.

Rogue Wave ships DBFactory

Rogue Wave Software, Inc. in Corvallis, Ore., recently rolled out DBFactory, a graphical code generator that automatically creates C++ classes from database structures. DBFactory runs under Windows NT and costs $995 for a single-user license. It lets developers use a mouse to select database elements and operations to incorporate in each class, which makes it easier to build database interfaces in C++. Versions for other Windows platforms and Unix will be available by March.

CA ships kit for CA-Unicenter

Computer Associates International, Inc. has begun shipping a software developer's kit for CA-Unicenter/TNG, a forthcoming three-dimensional, object-oriented version of the vendor's systems management package.

If you exclude
the time it takes to learn, the money that it takes to train, the elusive reuse benefits, the resistance to change, the constantly arising trouble spots, the long lead times required to build applications from scratch, complex low-level programming languages, lack of scalability, the shortage of talent, limited platform support, the performance penalties, deployment challenges, heavy maintenance, difficulty in comprehension, and the expense of manually reapplying your customization,
object technology is quite beneficial.

INTRODUCING COMPONENTS. PROGRESS VERSION 8.
POWERED BY PROGRESS.

To find out about the complimentary Progress seminar in a city near you call 1-800-989-3773 ext. 1611 or visit us on the Web at http://www.progress.com.

PROGRESS and POWERED BY PROGRESS are registered trademarks of Progress Software Corporation

Unix, OS/2 hold their ground against NT

By Stuart J. Johnston

In the cacophony over Microsoft Corp.'s Windows 95 and Windows NT, it is easy to overlook other operating systems that are alive and well in corporate America.

Among them are IBM's OS/2 and the various flavors of Unix, which continue to multiply. Although industry research firms don't keep track of the installed base for Unix, they do track year-to-year change.

Last year, for example, Unix sales in the server market increased 4.6% compared with 1994, while sales of desktop/workstation units increased by 5.5%, according to projections by industry researcher International Data Corp. (IDC) in Mountain View, Calif.

That translates into nearly 500,000 Unix server shipments last year and 900,000 Unix desktops, according to IDC's projections.

At the same time, OS/2 sales expanded by almost 23% on servers, for a total of 280,000 new units, and by 9.9% on the desktop, for a total of 3.2 million units.

NT sales grew by 216% on the server and 134% on the desktop last year. However, NT's actual sales numbers for last year were smaller than for Unix or OS/2. Microsoft sold only 363,000 units of NT Server and 489,000 units of NT Workstation.

Closer Look
OPERATING SYSTEMS

Unix has been gradually worming its way into enterprise computing systems and slowly eroding some of the mainframe's role as the main repository for corporate data, said Tony Iams, a research analyst at D. H. Brown Associates, a research firm in Port Chester, N.Y.

Unix also remains strong in its traditional niches — the technical, scientific and engineering workstation markets, analysts said.

Unix machines can be clustered to magnify their power, while NT machines can't — not yet anyway. As long as that remains true, Unix will continue to own much of the high ground in enterprise markets, according to analysts and industry insiders.

Some customers are saving by buying NT-based Intel Corp. machines as technical workstations instead of the more expensive Unix-based RISC boxes, said Jean S. Bozman, research manager at IDC.

"Over the next three to five years, NT will eat away at the technical workstation markets," said Tom Willmott, vice president of Aberdeen Group, Inc., a research firm in Boston.

Unix converts

But even some dyed-in-the-wool Windows shops still see the benefits of using Unix in niche areas.

Menlo Park, Calif.-based Sequus Pharmaceuticals, Inc. has chosen Windows 95 on the desktop and NT on servers. But the company also has a pair of Sun Microsystems, Inc. Solaris-based servers that run medical systems and laboratory analysis packages that aren't available on NT, said Randy Dugger, director of IS.

Early on, OS/2 became known for robust and secure multitasking as well as some key applications such as Notes that were available only on that platform.

That proved a boon for companies that decided to move to client/server technology before that trend caught on. For instance, Fireman's Fund Insurance Co. in Novato, Calif., committed to OS/2 more than six years ago.

"In the late 1980s, OS/2 was the only operating system in town that could support our mission-critical needs on the client side," said Robert O'Brien, systems adviser at Fireman's Fund.

Fireman's Fund is happy with its OS/2 investment and will remain committed to the operating system for the foreseeable future, O'Brien said.

If Fireman's Fund were starting from scratch today, however, it would have to look seriously at NT, O'Brien conceded.

Even IBM acknowledges that it isn't likely to gain much ground in the short term against the Microsoft juggernaut, according to John Schwarz, vice president of marketing at IBM's Personal Software Products group.

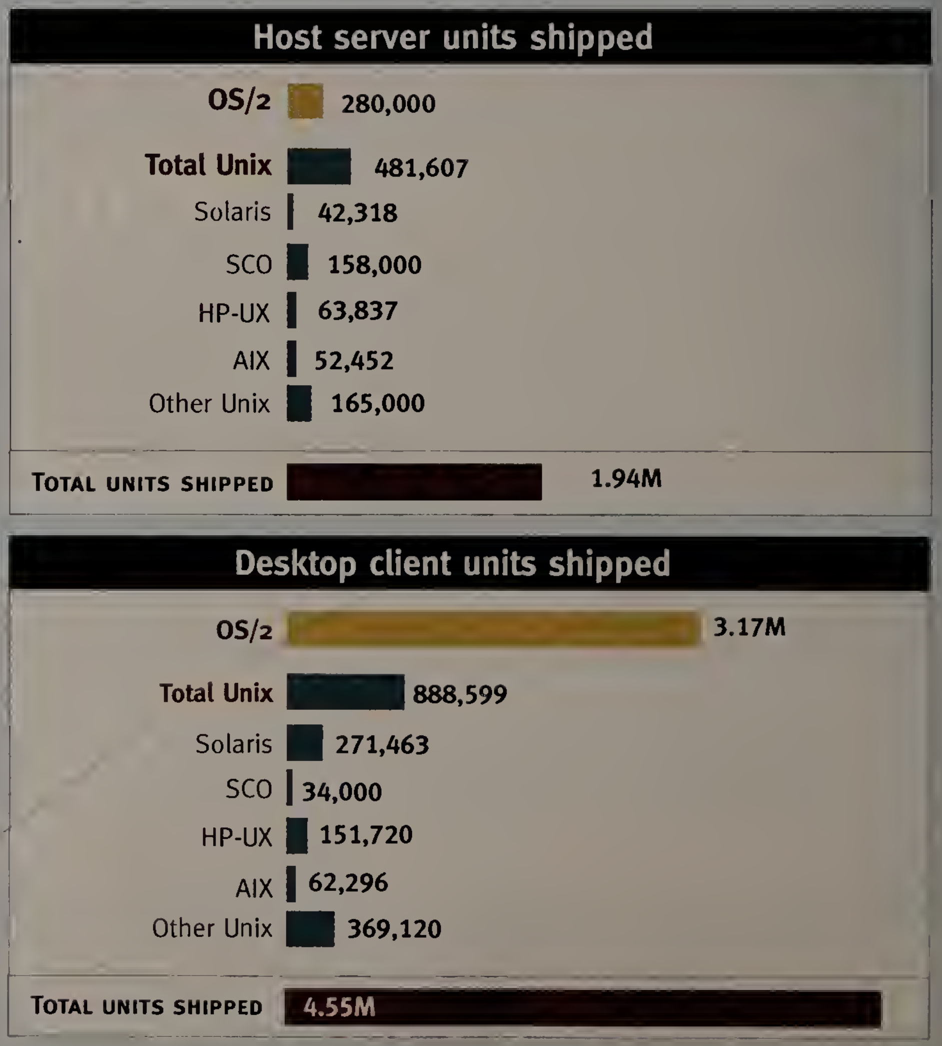
"If you look at the corporate desktop, there are two classes," Schwarz said. One is general productivity, and "clearly Microsoft has a very convincing lead in that market." The second class is mission-critical applications, and here, IBM is "a 45% to 50% player," he added.

Therefore, IBM will concentrate on building OS/2 in markets where it has a significant presence, Schwarz said. Those include mission-critical and custom applications in areas such as finance, insurance, telecommunications, manufacturing, distribution, government and transportation in both client and server markets.

Schwarz said the company views Notes, which it now owns, as a critical selling point for OS/2. Indeed, IBM will release a comprehensive communications server, OS/2 Warp Server, this week.

The firm also plans to release a server suite bundle code-named Project Eagle. It includes Notes Server for OS/2, in the first half, according to an IBM spokesman.

OS/2 and Unix operating systems



Source: International Data Corp., Framingham, Mass.

Q:
A:

What's the easiest, fastest, most cost effective way to migrate my legacy systems?

With the Reengineering Server™ (ReS)™ and P/390 technology from ITC.

- Intel® or RISC platforms
- No modifications
- No retraining issues
- No down time
- Run two systems for the price of one, concurrently

See ITC's ReS system in action at the SHARE Conference, March 5-7 in Anaheim, CA. Booth #432.

Intel is a registered trademark of Intel Corp.

IBM Business Partner

Information
Technology
Company
210 Little Falls Street, Suite G2
Falls Church, VA 22046
Phone: (703) 237-7370
Fax: (703) 237-0223
E-Mail: JCP390@aol.com
Toll Free: 1-800-994-9441

New Products

Fujitsu Systems Business of America, Inc. has introduced LiveHelp, help desk remote control software.

According to the Santa Clara, Calif., company, LiveHelp gives help desk personnel remote control and screen-sharing capabilities for real-time, on-line support and training. LiveHelp was designed to let help desks teach users, guide them to answers and cut down on repetitious help calls. Users also can pass a complex help call to a more knowledgeable expert.

Remote users can access LiveHelp through LANs, WANs and modem connectivity. The product includes drawing tools and whiteboard functions and operates on Windows 3.1 and Windows 95.

Pricing for LiveHelp clients starts at $1,750 for a 10-user pack.

▶ *Fujitsu Systems Business of America*
(408) 988-8012

Rhode Island Soft Systems, Inc. has unveiled TrueType Signature Fonts.

According to the Woonsocket, R.I., company, the product can create a scalable font of an individual's signature that can be incorporated into word processing documents, faxes, mail-merge documents and form letters.

Signatures can be divided so that only a first name is printed.

TrueType Signature Fonts cost $75 per signature.

▶ *Rhode Island Soft Systems*
(401) 767-3106

Insight Software Solutions, Inc. has introduced Zip Express, a ZIP code reference tool for Windows applications.

According to the Bountiful, Utah, company, Zip Express is a lookup/auto-paster product that lets users automatically search by ZIP code, city, county or state. It also can be used as a background program that lets users paste ZIP code information directly into a Windows application.

Zip Express costs $40.

▶ *Insight Software Solutions*
(801) 295-1890

PKWare, Inc. has unveiled PKZip 2.0 for Windows, a data compression utility.

According to the Brown Deer, Wis., company, PKZip 2.0 for Windows is a 16-bit program that lets users compress graphic and data files to save hard-disk space.

The product was designed to let users drag and drop files from a file manager or the Windows 95 explorer into PKZip. Users also can create and extract archived files. Users can open multiple archived files, encrypt passwords on files and exclude files and directories when they create a file.

PKZip 2.0 costs $29.

▶ *PKWare*
(414) 354-8699

Software Publishing Corp. has announced ASAP WordPower 1.95.

According to the San Jose, Calif., firm, the product transforms word processing files into visual presentations. It lets users drag and drop layouts and features 22 layout choices and transition effects.

ASAP WordPower 1.95 costs $99.

▶ *Software Publishing*
(408) 537-3000

MapInfo Corp. has introduced MapInfo Desktop, mapping software.

According to the Troy, N.Y., company MapInfo Desktop lets users incorporate desktop mapping into work processes by dropping map objects into applications. It includes more than 300M bytes of worldwide demographic data, statistics and maps.

MapInfo Desktop costs $349 and runs on Windows 3.x, Windows 95 and Windows NT.

▶ *MapInfo*
(518) 285-6000

TELL
COMPUTERWORLD'S
READERS
you're hiring
in Computerworld's
1996 BEST PLACES TO WORK
Magazine. Deadline: April 17
1-800-343-6474 x8201

If you invest in technology, our two cents could be your greatest asset.

Announcing Computerworld's Finance & Investing Section

You rely on Computerworld to deliver the comprehensive information you to need to make smart IT decisions. Now we're getting personal — with **Finance & Investing**, our new section designed to help you reach your own financial goals.

Finance & Investing brings you a wealth of information and analysis on what's driving the red-hot technology sector. It's coverage that filters out the noise and delivers the story behind the numbers — the real deal on this industry's movers and shakers, winners and losers.

The bottom line? **Finance & Investing** goes well beyond Computerworld's Stock Ticker feature to let you cash in on:

- A look at hot investments in different technology categories
- Tips on finding financial advice on the Internet
- Analysis on hot tech stocks of the moment

Insights that help you make personal technology investment decisions on a dime. Hey, when it comes to the fast-moving world of IT, the stakes are high. Don't get caught short on information — invest some time in our new **Finance & Investing** section today.

Now more than ever, Computerworld delivers everything you need to know. Right here, right now — with **Finance & Investing.** You can bank on it.

COMPUTERWORLD
Everything you need to know.

Finance & Investing
Street Beat
The best things in
COMPANY PROFILE
Sharing the Wealth

Today, the question is how do you best orchestrate your local and wide area networks to maximize your investment and be more competitive? How do you get different networking products from multiple vendors to play in harmony? And where can you get an objective perspective for full network support? From structured cabling systems and active LAN and WAN data management to design, sourcing and maintenance services?

WATCH OUT FOR ADVICE THAT PLAYS HAVOC WITH YOUR NETWORK.

Anixter. Nobody knows networking like we do. *Because we partner with all the leading suppliers, we're not tied to single-vendor solutions. Through our network integration service, we'll help you design, implement and support your network so you're free to focus on applications and future planning. For productive solutions to keep your network in tune with your business demands, listen to Anixter.*

1-800-ANIXTER

http://www.anixter.com

ANIXTER

©1995 Anixter Inc.

Agile package simplifies VLAN management, 60

NII Testbed sounds alarm

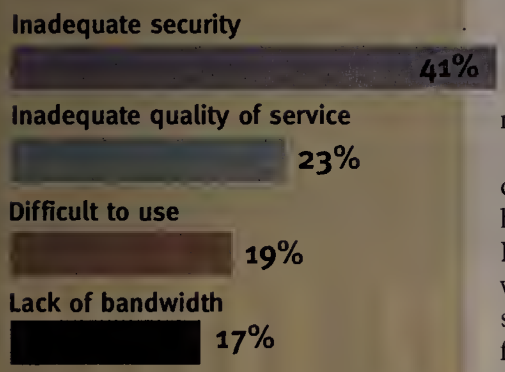
By Gary H. Anthes

Loss of public support for the National Information Infrastructure (NII) ultimately would lead to the economic decline of the U.S., the NII Testbed warned.

The NII Testbed, a consortium of 48 companies, universities and national laboratories, said jokes about the "information superhypeway" and the "National Illusionary Infrastructure" are the result of a dearth of concrete examples of how the NII can address real national challenges.

In a report, "The Unfinished Business of the NII," the consortium urged users to join with product and service vendors to develop network-based applications that improve productivity (see related story below). The applications must be useful to others and capable of replication in other environments, according to the report.

What is the greatest challenge to the Internet's development?



Base: 48 members of the National Information Infrastructure Testbed

Source: National Information Infrastructure Testbed, Denver

"I think there's been too much emphasis on things like how can you pass a credit card securely over the Internet," said Ken Crutchfield, a staff consultant at The Dun & Bradstreet Corp. "I can't even find anything I want to buy yet."

Crutchfield, director of electronic commerce applications for the NII Testbed, said companies spend a lot of time developing technology but neglect the legal and cultural barriers to using the NII.

Just one slice

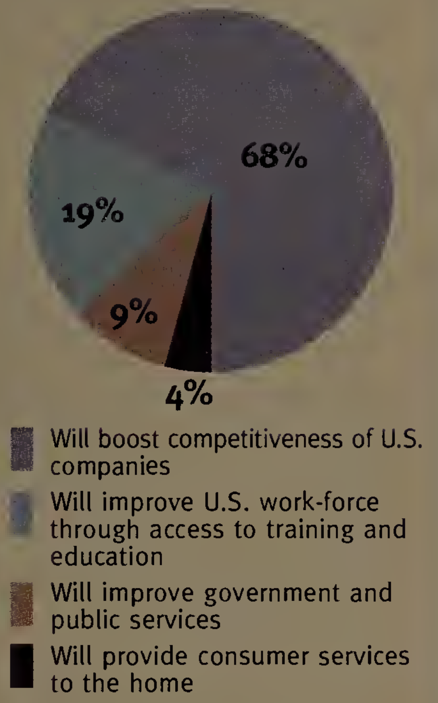
The Internet is just one component of the NII. It also includes the supporting infrastructure of hardware and software, database contents and other communications systems that move data and connect to the Internet, the consortium said.

The private, nonprofit NII Testbed was founded in 1993 to develop pilot projects that will accelerate the development of the NII. So far it has launched several projects in fields such as manufacturing, health care, retailing and environmental protection.

For example, the consortium may accelerate deployment of interactive video in hospitals. NII Testbed member Denver Health and Hospitals is setting up two-way video telemedicine links between trauma specialists at Denver General Hospital and facilities elsewhere in Colorado.

The hospital already has network connections to the suburban Arapahoe County Jail; the connections have reduced face-to-face contact between physicians and inmates by 95% and saved $24,000 in transportation costs in two months.

What is the greatest potential benefit of the National Information Infrastructure?



- ▨ Will boost competitiveness of U.S. companies
- ▨ Will improve U.S. work-force through access to training and education
- ▨ Will improve government and public services
- ■ Will provide consumer services to the home

Base: 48 members of the National Information Infrastructure Testbed

Source: National Information Infrastructure Testbed, Denver

According to Dr. Allan Liebgott, director of telemedicine at the hospital, telemedicine is "highly satisfactory" to patients 70% to 90% of the time. "But medical professionals are much more skeptical and cynical than the public about this."

Liebgott said professionals worry about confidentiality and licensing issues when they practice across state lines.

Industry holds the key to NII growth

Unlike other countries, such as Japan, the U.S. isn't developing the NII with public funds.

Therefore, it is up to industry to make the business case for it, the NII Testbed consortium said.

That requires investing in application testbeds that build a popular constituency for government actions such as strengthening intellectual property rights and removing burdensome laws and regulations, the group said.

The NII Testbed isn't the only user-oriented group singing the praises of the NII. "Although the information highway structure is still in the concept state, it is clear that businesses will be one of the major benefactors of, and contributors to, the highway's capabilities," according to a recent statement by the Society for Information Management (SIM).

SIM has launched a program devoted to fostering the development of the NII for business users. It pledges to do the following:

- Provide advice to, and shape the benefits of the NII for, U.S. enterprises.
- Ensure that applications benefit consumers and taxpayers.
- Endorse standards that are in the best interests of users rather than service providers. — *Gary H. Anthes*

Bandwagon for public groupware networks fills up

By Tim Ouellette

Users who want groupware without the pain of maintaining it will get more choices this year.

Lotus Development Corp.'s Notes is the best known of these efforts, through its alliance with AT&T Corp.'s Network Notes. Users typically opt for Network Notes instead of rolling their own Notes setups to avoid the costs of building and maintaining a groupware infrastructure.

"I look at AT&T Network Notes as outsourcing. I'd rather them do it," said Jody Lane, president of TitleLink in Dallas.

Notes also is available from third-party providers via WorldCom, an international Notes network, and CompuServe, Inc.'s Enterprise Information Link. The following products are on the way:

- BT's Network for Lotus Notes will be available throughout Europe this month.
- IBM's Global Network will provide general availability for Notes by May.
- US West Communications, Inc. and Bell Global Solutions of Canada are piloting Notes services.

More enhancements

Meanwhile, Microsoft Corp. and Novell, Inc. have similar plans for their groupware products. Microsoft inked a deal with MCI Communications Corp. late last month; it includes offering MCI Network subscriber access to Microsoft's Exchange Server, which is due to ship this quarter. Novell officials said they plan to offer similar services for Groupwise XTD, which is expected to ship by midyear.

Networking Notes

More on-line service providers such as AT&T are offering groupware features that help improve intercompany applications. Some reasons to subscribe to an on-line Notes service include:

- A high amount of Notes traffic going outside the LAN
- Large, geographically dispersed workgroups
- Communication with a large number of customers and suppliers
- A lack of internal Notes server administration resources
- Plans include expanding the number of Notes users without additional network resources and staff

But industry watchers say the World Wide Web could steal users away from these public groupware networks.

Trouble ahead?

"I still haven't been convinced at this late date that there is an opportunity" for Network Notes and the like, said Eric Arnum, editor of "Electronic Mail & Messaging Systems," a newsletter in Washington. "The Web is flattening the on-line services industry in general, one service after another."

Public groupware networks can fill a gap, he said, by offering business applications to go

Groupware, *page 60*

There's only one way to gain control of your environment — PATROL

Performance and availability issues are flaring out of control. Worse, your users are informing you of the problems. To change the scenario, you've got to proactively monitor and manage applications, the databases they run on and the underlying resources. You also have to make the most of the system and network management frameworks you have in place.

There's only one solution – PATROL from BMC Software.

Only PATROL puts it all together. And with 16 years of experience, more than 100 products and numerous technology partnerships, BMC Software – the world's largest database and application management tool vendor – is the company you can rely on to deliver it TODAY.

Unrivaled database management –

- CA-Ingres
- CA-OpenIngres
- DB2 for AIX
- DB2 for MVS†
- DB2 for OS/2
- Informix
- Microsoft SQL Server
- ObjectStore
- Oracle
- Rdb
- Sybase
- With more in development.

† available 2Q 96

before you feel the heat

Unparalleled application management –

- Lotus Notes
- Oracle Financials
- PeopleSoft HR†
- SAP R/3†
- TUXEDO System
- With many more in development.

Unmatched integration today –

- CA-Unicenter
- Cabletron SPECTRUM†
- HP OpenView
- IBM NetView for AIX
- POLYCENTER Manager on NetView
- Solstice SunNet Manager
- Remedy ARS
- Tivoli TME

Unequaled hardware & operating system support –

Only PATROL runs on more than 20 hardware platforms and operating systems including:

- MVS†
- Open VMS
- OS/2
- Unix
- Windows NT
- Windows 95†
- With more in development.

Keep your cool. Discover and correct problems before they impact your organizational productivity. Only PATROL can help you monitor and manage the big picture. For a white paper or for a free trial, call 1 800 811-6766 or 713 918-8800 (ext. 1371). Or visit our home page at http://www.bmc.com/pat

BMC®
SOFTWARE

BMC Software offices are located in Australia, Belgium, Brazil Denmark, France, Germany, Italy, Japan, the Netherlands, Singapore, Spain and the United Kingdom. Distributor and agent offices in 25 countries. BMC Software and the BMC Software logo are registered trademarks of BMC Software, Inc. in the USA and in other select countries. ® and ™ indicate USA registration. All other products mentioned are either trademarks or registered trademarks of their respective companies ©1996, BMC Software, Inc. All rights reserved

Package streamlines VLAN management

By Bob Wallace

ATM start-up Agile Networks recently announced a switch/management package that automates the long and arduous process of creating and managing virtual LANs.

Virtual LANs (VLAN) are logical, not physical, networks. They enable network managers to create workgroups of users who need to communicate and access common resources regardless of the physical network they use. Network managers, for example, could create one workgroup for manufacturing, one for administrators and one that links all executives.

Agile's ATMizer switch builds VLANs automatically. Network administrators assign a network address to each device linked to the ATM switch. The devices then broadcast relevant data across the network to the switch, and the VLANs are built.

Although almost every major switch vendor has promised switch and software that automates the creation of VLANs, Agile was the first to deliver. Its wares let users move throughout a network without leaving their VLAN. That means users can move anywhere in the company and still remain part of the original VLAN without additional programming.

One user at an Agile beta site lauded the package.

"We desperately needed to automate the creation and simplify management of VLANs," said Tony Fortenberry, a telecommunications analyst at the University of Mississippi in Oxford. The school has a fairly small staff but still needs to support its students, faculty and staff who move around and need to connect to the network at any location, he added.

Fortenberry evaluated similar promised offerings from Cabletron Systems, Inc., Bay Networks, Inc., Cisco Systems, Inc. and start-up Xylan Corp. At the time of his testing, "No one had as fully an automated approach as Agile," he said. "Although some had the hardware, most didn't have the software completed and ready to go."

Less convenience

Other switch vendors offer some level of VLAN support, but most would have required Fortenberry to manually create a database of all users by media access control address and then manually drag and drop them — using a graphical screen and icons — into the VLANs.

One analyst said Agile's VLAN technology is unique. "Agile is providing a totally different approach from everyone except for Xylan, which is just rolling [something similar] out," said Eric Hindin, a program director at The Yankee Group, a Boston consultancy.

In the Agile scheme, the information from all network devices is fed from the ATMizer switch to the vendor's ATMman management package. This lets network managers create policies, or rules that govern what users can and can't do on the network. They include, for example, the ability to log on from any machine on the network vs. logging on from one specific computer only.

The Simple Network Management Protocol-based network management package runs on Unix workstations from Sun Microsystems, Inc. and Hewlett-Packard Co. and is available under HP's OpenView network management system. The vendor has no immediate plans for PC versions.

ATMman is available now; prices start at $1,500.

ATMman	
Description:	An object-oriented SNMP-based management application for use with Agile ATMizer ATM switch
Platforms supported:	SPARCstation or HP workstation
RAM:	32M bytes
Disk space:	100M bytes
Availability:	Now
Price:	Starts at $1,500

Management tools address NetWare needs

By Patrick Dryden

Many network supervisors get a warm and fuzzy feeling about Novell, Inc.'s NetWare because they grew up in that operating system environment. But all appreciate the wealth of management tools that the market leader attracts.

Already mature products continue to gain enhancements, and new options pop up from the following start-ups and overseas companies:

- Last week **Alexander LAN, Inc.** in Nashua, N.H., launched Version 2.0 of its Server Protection Kit. The software automatically diagnoses NetWare servers to help prevent failure and resurrects crashed systems to reduce downtime.

The kit's three components offer improved automation to help local or remote engineers deal with crises involving servers that run NetWare Versions 3.11 through 4.10.

The emergency diagnostics program takes over after a crash to analyze conditions and store them in a file. Now it offers new options for restarting the server and sending its reports to internal or vendor support staff.

The NetCheck program can prevent common crashes, and the extended debugger improves evaluation during server post-mortem exams. It costs $698 per server.

Management applications

- The SysMaster line from **Loan System** in Creteil, France, made its U.S. debut at Networks Expo in Boston recently. This performance management suite monitors NetWare, Unix and Windows NT servers from a single console.

Loan System initially targets just NetWare 3.x and 4.x servers in North America, but the company promises the other versions as soon as it establishes support here. SysLoad for NetWare 4.0 is available from two consulting and outsourcing companies: NCN, Inc. in Phoenix and CompuDesign Group, Inc. in Calgary, Alberta. It is priced at $995 for 25 concurrent users.

SysLoad tracks server resource use by users, groups and applications. It offers numerous options for monitoring, displaying and handling events to help administrators spot trends and troubleshoot problems.

- **BindView Development Corp.** in Houston updated BindView for NDS, its suite of tools for monitoring NetWare 4.x servers and all objects in the NetWare Directory Services (NDS) tree.

Version 4.0C adds two dozen enhancements for analyzing NetWare security, including a "rights map" that shows how one object inherits rights to others on the NDS tree. Also, administrators can analyze disk space usage by groups of users across the entire NDS tree. It costs $595 per server and $495 for the monitoring console.

- **Knozall Systems, Inc.** in Chandler, Ariz., improved NLMerlin 3, its job-scheduling and scripting tool for NetWare servers and stations.

Now central administrators can write jobs centrally and schedule them to run on remote, unconnected LANs via a dial-up link. Other enhancements expand job-control options and transfer files to stations in background mode. NLMerlin 3 starts at $2,395.

Knozall Systems also promised in March support for NDS and an integrated file-compression utility.

- **Measurement Techniques, Inc.** in Stoughton, Mass., launched LANTest Benchmark Software to help troubleshooters isolate the cause of network performance problems from the user end.

The LANTest suite runs on a DOS or Windows-based PC station to check network subsystems from that station's perspective. No probes or protocol analyzers are required.

Performance tests begin locally with the processor, memory and I/O for disk and network and then involve the servers and routers of LAN or WAN segments. Graphic displays identify possible problems and suggest solutions.

The LANTest introductory price is $25.

Measurement Techniques developed the benchmark tools to demonstrate performance improvements made possible by another product. Shared LAN Cache is station-based cache software that helps improve server performance and decrease network use by off-loading frequently requested files to the station itself.

Groupware

CONTINUED FROM PAGE 57

with their infrastructure and network support.

For example, TitleLink provides a real estate title application of the same name for AT&T Network Notes.

But public groupware networks won't stand still. For instance, Lotus is upgrading the public network version of Notes 4.0 this month to include server clustering, partitioning and use tracking.

This will provide constant server availability, let service providers place more than one customer on a single Notes server and provide statistics for accurate billing.

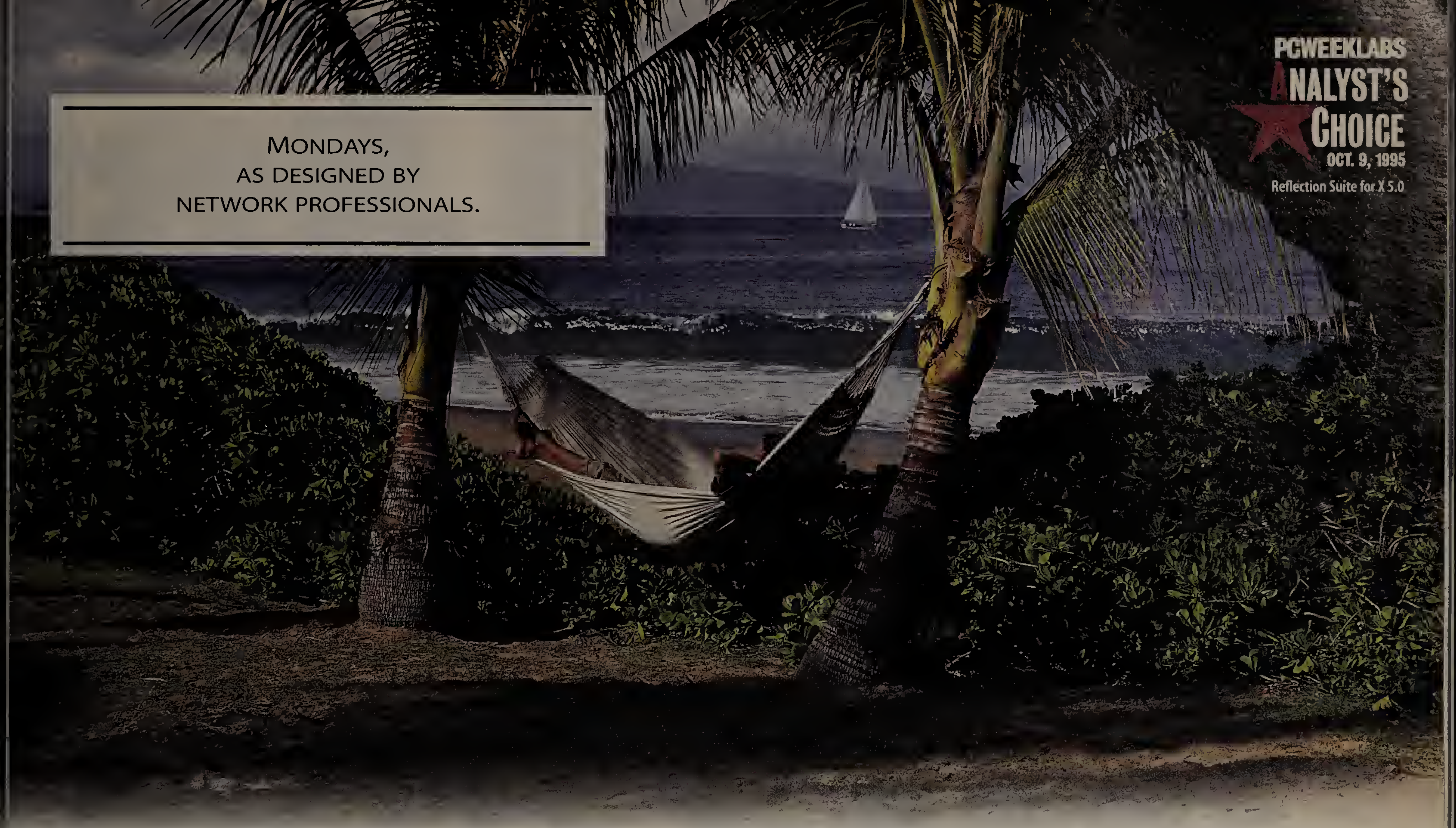
New Product

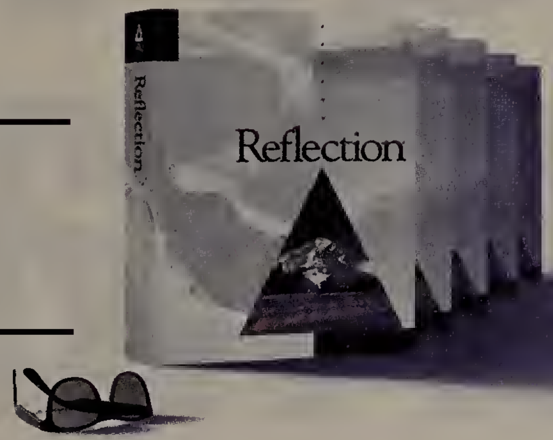
Precept Software, Inc. has announced FlashWare, a general-purpose, standards-based software platform for running multimedia on existing networks.

According to the Cupertino, Calif., company, FlashWare lets users transport real-time, synchronized multimedia streams over packet-switched networks. On the sending side of the data path, it takes in data streams, compresses and packets them, and sends them over the network through a WinSock interface TCP/IP protocol stack. On the receiving side, it accepts incoming packets, turns them into frames, decompresses them, synchronizes multiple streams and issues prioritization requests for network resources.

FlashWare is available for Microsoft Corp.'s Windows 3.11. It will be available for Windows 95 and Windows NT in the second quarter. It costs $249 for the client and $399 for the server.

▶ *Precept Software*
(408) 446-7600





ENTERPRISE-WIDE
CONNECTIVITY, AS DESIGNED
BY NETWORK PROFESSIONALS.

If it were up to you, your hard work would finally pay off. Mainframes, PCs, minicomputers and servers would all fit together seamlessly, and Monday would be just another day at the beach.

REFLECTION® SOLUTIONS

REFLECTION PC-TO-HOST CONNECTIVITY SOFTWARE

- UNIX, X, HP, DIGITAL, AS/400 AND 3270 CONNECTIVITY
- WINDOWS, DOS, AND MACINTOSH PLATFORMS
- INTUITIVE OPERATIONS, FAST FILE TRANSFER, ADVANCED TEXT AND GRAPHICS EMULATION, AND POWERFUL PROGRAMMING TOOLS

REFLECTION NETWORKING SOFTWARE

- COMMUNICATIONS: TCP/IP, UDP, LAT, NS/VT, IPX/SPX, SLIP, CSLIP
- ARCHITECTURE: VxD/DLL DESIGN; 100% WINDOWS SOCKETS COMPLIANT
- FULL-FEATURED APPLICATIONS (FTP, LPR/LPD, INTERNET ACCESS)
- EASY CONFIGURATION AND MANAGEMENT
- OPTIMIZED FOR MOBILE/WIRELESS COMPUTING

AVAILABLE AS SUITES AND INDIVIDUAL PRODUCTS, TAILORED FOR ANY ENTERPRISE CONFIGURATION.

CALL 800.926.3896 IN EUROPE, CALL +31.70.375.11.00
OUTSIDE EUROPE, CALL 206.217.7100
INTERNET: sales@wrq.com WEB: http://www.wrq.com

WALKER RICHER & QUINN, INC. / 1500 DEXTER AVENUE NORTH, SEATTLE, WASHINGTON 98109 USA / FAX: 206.217.0293 ▲ BUITENHOF 47, 2513 AH DEN HAAG, THE NETHERLANDS FAX +31 70.356 12 44 ▲ WILHELM MARX HAUS, HEINRICH-HEINE ALLEE 53, 40213 DÜSSELDORF, GERMANY / FAX +49.211.8307 360 ▲ LE DÔME, BP 10910, 1 RUE DE LA HAYE, 95731 ROISSY CDG CEDEX, FRANCE / FAX +33.1.49 19.22 16 ▲ WRQ AND REFLECTION ARE REGISTERED TRADEMARKS OF WALKER RICHER & QUINN, INC.
ALL OTHER TRADEMARKS ARE THE PROPERTY OF THEIR RESPECTIVE HOLDERS.

Reflection TCP/IP

Impossible? Not with Reflection® from WRQ. Reflection offers complete, integrated PC connectivity software for your entire enterprise—including transport protocols, PC X server software, and terminal emulation. All with the management features, open standards, and service and support you need.

To try connectivity designed from your point of view, call today for a free evaluation copy. We'll make sure that from here on out, your Mondays go swimmingly.

For a FREE evaluation copy
of any Reflection® product, call

800.926.3896

WRQ Reflection
CONNECTIVITY FOR A CHANGING WORLD

Tivoli Just
Independen
But That D
You Have To.

Lost Its
ce.
oesn't Mean

Special Tivoli Software Trade-In Incentives. Call for details!

As the world's largest independent business software company, we know just how important "independence" can be.

In fact, it's the most critical aspect of network and systems management software. Because the only way to manage hardware and software resources from a variety of different vendors is to use management software that is "vendor-neutral."

That explains why some Tivoli users might suddenly be feeling blue. They're questioning how a tiny $49 million software company will be able to remain impartial to their new $70 billion hardware company owner.

They're wondering why IBM competitors like HP, Microsoft, Sun and DEC would ever share confidential development information or provide support for an IBM-owned Tivoli.

They're concerned that the open systems management solution they chose – no longer is.

Well, the good news is that the leading network and systems management solution still is independent.

Because our clients cherish our independence.

Almost as much as we do.

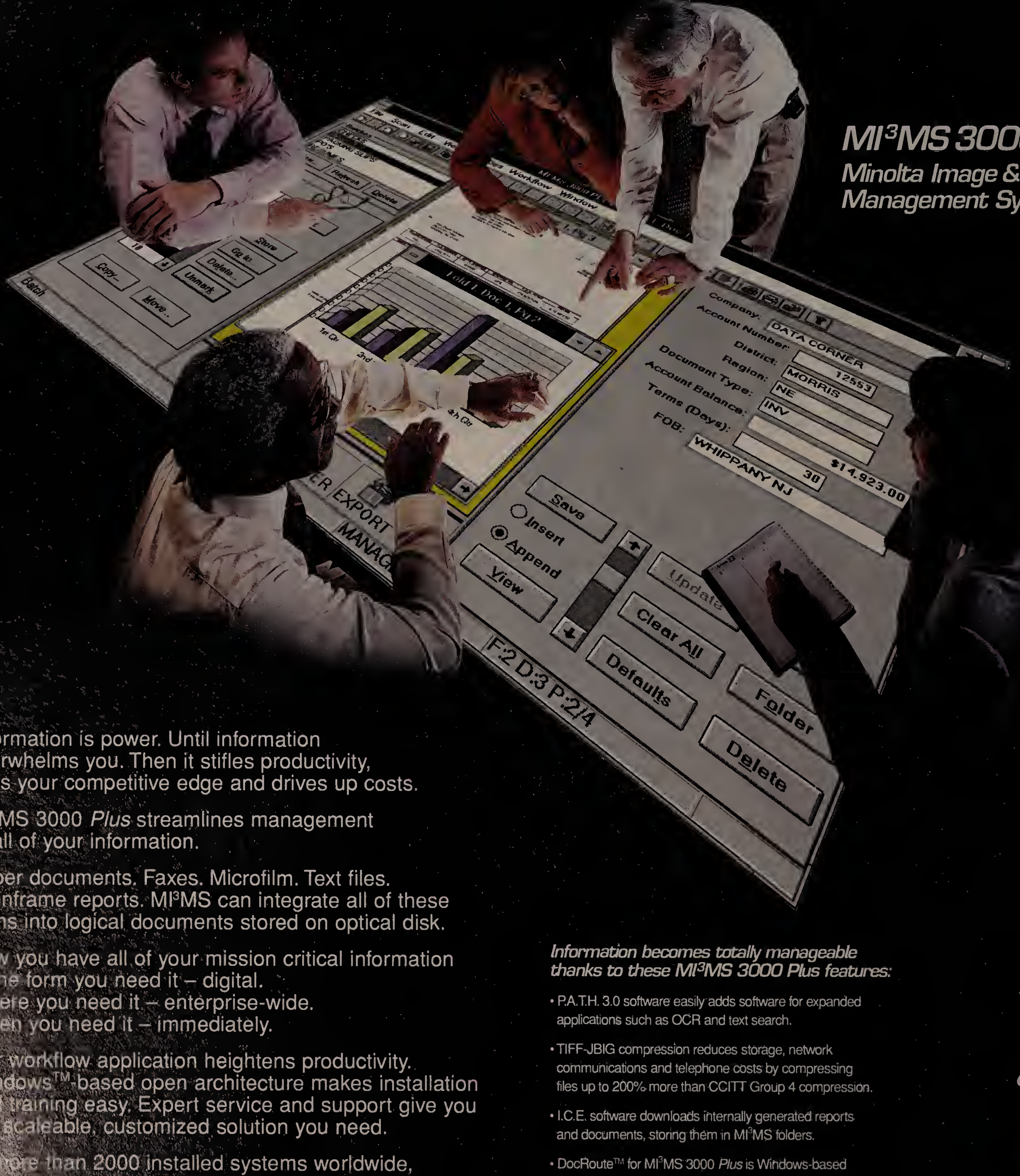
COMPUTER® ASSOCIATES
Software superior by design.

For More Information On Our Open Systems Management Solution, Call 1-800-225-5224.

CA-Unicenter®

© 1996 Computer Associates International, Inc., Islandia, NY 11788-7000 All other product names referenced herein are trademarks of their respective companies.

Now everyone can manage the power of information!



MI³MS 3000™ Plus

Minolta Image & Information Management Systems

Information is power. Until information overwhelms you. Then it stifles productivity, dulls your competitive edge and drives up costs.

MI³MS 3000 *Plus* streamlines management of all of your information.

Paper documents. Faxes. Microfilm. Text files. Mainframe reports. MI³MS can integrate all of these items into logical documents stored on optical disk.

Now you have all of your mission critical information in the form you need it – digital.
Where you need it – enterprise-wide.
When you need it – immediately.

Our workflow application heightens productivity. Windows™-based open architecture makes installation and training easy. Expert service and support give you the scaleable, customized solution you need.

In more than 2000 installed systems worldwide, Minolta Imaging Systems are proving that now you can manage all of your information in ways you've never imagined.

Call 1-800-9-MINOLTA

Information becomes totally manageable thanks to these MI³MS 3000 Plus features:

- P.A.T.H. 3.0 software easily adds software for expanded applications such as OCR and text search.
- TIFF-JBIG compression reduces storage, network communications and telephone costs by compressing files up to 200% more than CCITT Group 4 compression.
- I.C.E. software downloads internally generated reports and documents, storing them in MI³MS folders.
- DocRoute™ for MI³MS 3000 *Plus* is Windows-based and provides a seamless workflow application with intelligent routing, e-mail notification and status tracking.

Copiers
Cameras
Faxes
Digital Systems
Document Imaging
Camcorders
Binoculars
Color Sensors

Only from the mind of Minolta

MINOLTA

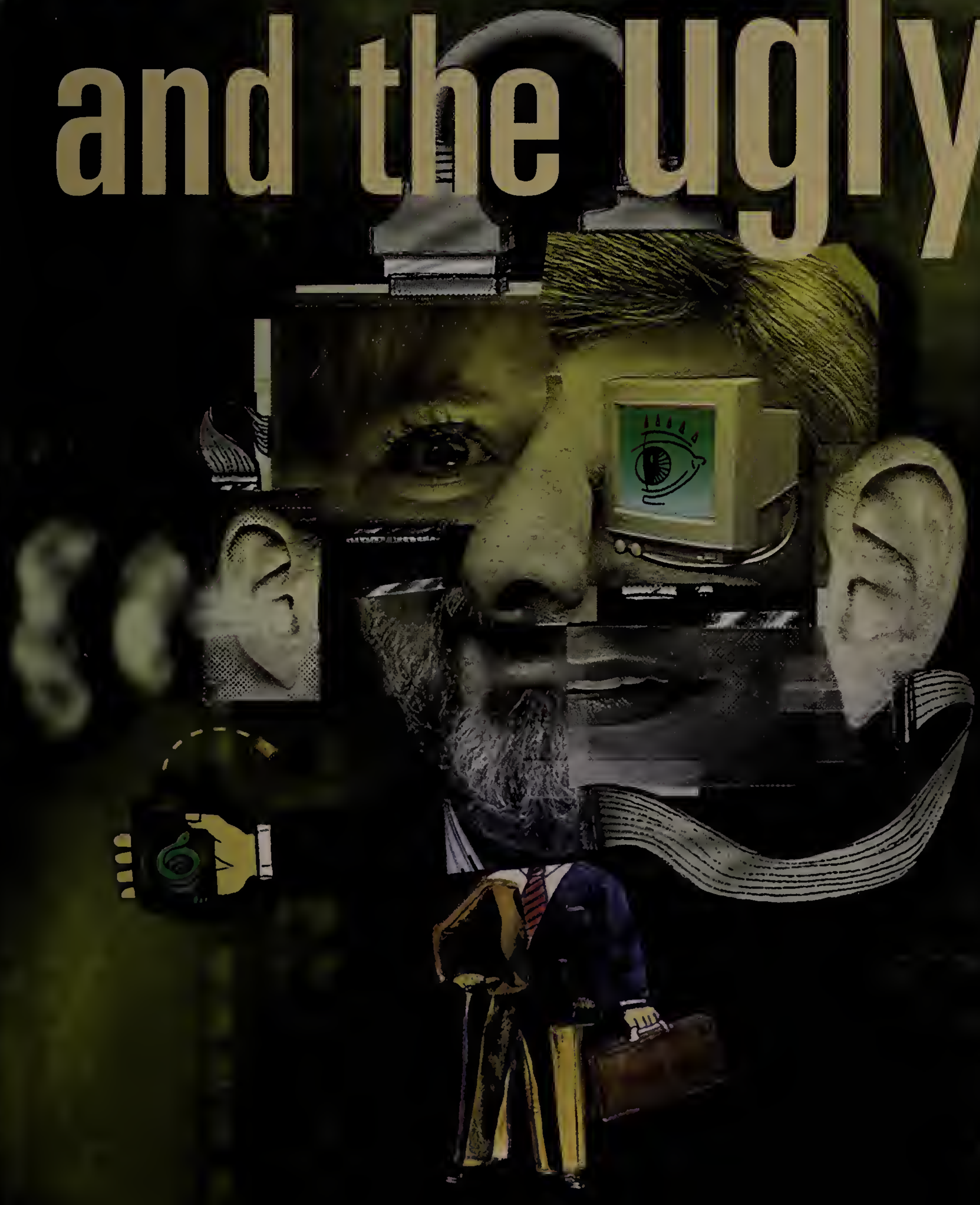
1996 MINOLTA CORPORATION, INC.
All trademarks and registered trademarks are property of their respective holders

COMPUTERWORLD

FEBRUARY 26, 1996

Rating 25 of the Largest Systems Integrators

The good the bad and the ugly



An exclusive Computerworld survey report

INSIDE:

TOP VIEW AND TOP 10 LIST SI/2

PICKING A PARTNER SI/3

TOP FIVE INTEGRATOR PROFILES SI/4

WHY THE BIGGEST AREN'T THE BEST SI/7

MORE THAN HARDWARE SI/9

TOP-DOWN VS. BOTTOM-UP SI/10

BAD RELATIONSHIPS SI/11

SAP HYSTERIA SI/13

SELLING THE 'NET SI/14

GOING GLOBAL SI/15

CUSTOMERS RATE THE INTEGRATORS SI/17

GETTING TO KNOW YOUR INTEGRATOR

There are any number of metaphors to describe a company's relationship with a systems integrator. Marriage seems to crop up a lot. Sharing intimacies, working shoulder-to-shoulder and maintaining open communication are all attributes of a sound partnership. When the relationship is going well, life can be very good. But when it breaks down, things can turn ugly.

Computerworld's rating of 25 of the largest systems integrators is intended to help you avoid ugly situations. With our partner, ParaTechnology, Inc., a Bellevue, Wash.-based market research and consulting company, *Computerworld* surveyed more than 1,000 information systems managers to gauge their level of satisfaction with their integrators. (See pages SI/17 and SI/18 for complete details of the findings and a description of the survey methodology.)

The Top 10

1. **AmeriData Technologies, Inc.**
2. **Unisys Corp.**
3. **Hewlett-Packard Co.**
4. **Control Data Systems, Inc.**
5. **USConnect, Inc.**
6. **Price Waterhouse**
7. **Digital Equipment Corp.**
8. **Deloitte & Touche**
9. **The Future Now, Inc.**
10. **MicroAge, Inc.**

Exclusive *Computerworld* Customer Satisfaction Survey

In addition to providing detailed customer satisfaction scores for these leading integrators, this report offers advice and case studies that will help you keep the relationship amicable.

The survey found that some companies, such as AmeriData Technologies, Inc., Unisys Corp. and Hewlett-Packard Co., consistently outperform their rivals in all 22 areas we measured. Others, such as Electronic Data Systems Corp., SHL Systemhouse, Inc. (recently acquired by MCI Communications Corp.), and Computer Sciences Corp. (CSC), don't do quite as well. This report examines why.

Of course, comparing AmeriData with CSC is not entirely apples-to-apples. Indeed, every integrator is different in some respects. For instance, AmeriData, with its origins as a value-added reseller, uses a "bottom-up" approach in its integration business; CSC uses a "top-down" approach. Top-down companies typically focus on consulting and application development, while bottom-up firms focus on technology implementation. (See "Top-Down vs. Bottom-Up" on page SI/10.)

Another difference is in the size of contracts. More than two-thirds of AmeriData's business comes from contracts of under $1 million, according to the survey. CSC, on the other hand, derives two-thirds of its business from contracts over $1 million, with 23% of its contracts in excess of $10 million. The bigger the project, the more complicated the relationship and the greater the potential for problems. (See "Big Britches" on page SI/7.)

The type or size of the contract notwithstanding, companies use a common set of criteria to evaluate an integrator's performance. More than anything, they expect technical competency, on-time delivery and a reasonable price. When these things are not forthcoming, relations can turn contentious.

The survey found that, to their own detriment, customers typically gloss over some criteria that are vital to the success of a project. For example, few consider conflict resolution and personal relations when selecting an integrator. Yet talk to experienced project managers, and they will insist that a formal conflict resolution mechanism is essential. Without it, communication breaks down, and lawsuits can result. (See "Avoiding the D Word" on page SI/11.)

The bottom line is hardly rocket science: Responsibility for a successful relationship lies with both customer and integrator. Like a marriage, it takes work and constant communication. My hope is that this report will provide a comprehensive picture of the systems integrator relationship. Keep it handy.•

— Bruce Rayner, Editor
Special Projects
Internet: bruce_rayner@cw.com

THE MOST IMPORTANT CRITERIA USED TO EVALUATE AN INTEGRATOR ...

1. Integrator's technical expertise	16%
Top ranked: IBM, HP, Unisys	
2. Project's actual completion time vs. scheduled	10%
Top ranked: AmeriData, Price Waterhouse, Unisys	
3. Project's final price relative to performance	7%
Top ranked: USConnect, Unisys, AmeriData	

...AND THE LEAST IMPORTANT (BUT POTENTIALLY SHOW-STOPPING)

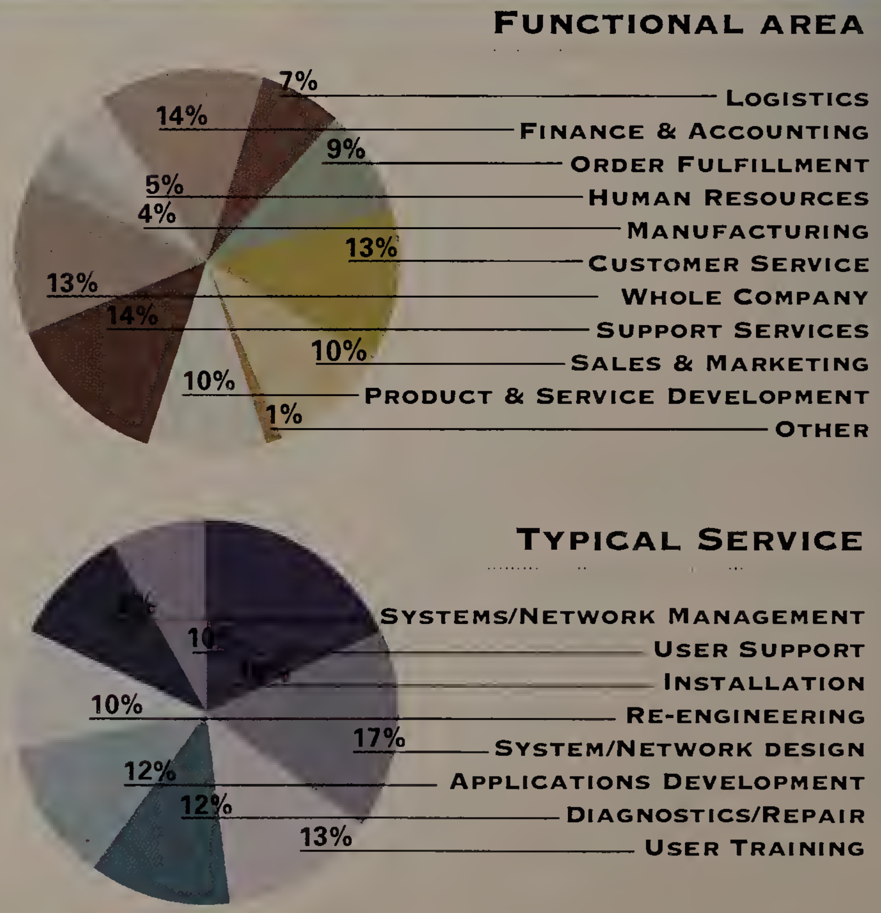
1. Integrator's problem resolution process	2%
Top ranked: AMS, AmeriData, Control Data	
2. Project's compatibility with other systems	2%
Top ranked: USConnect, AmeriData, Entex	
3. Personal relationship with systems integrator	1%
Top ranked: Unisys, AmeriData, Control Data,	
4. Training provided by systems integrator to company	1%
Top ranked: Deloitte & Touche, AmeriData, Price Waterhouse	

Based on the *Computerworld* survey question: What are the Top 3 aspects of the systems integration project in terms of importance to you as a customer? (Percent of total respondents.)

THE TOP THREE REASONS FOR USING AN EXTERNAL VENDOR FOR A SYSTEMS INTEGRATION PROJECT, AS OPPOSED TO INTERNAL RESOURCES

1. Lack of internal expertise	25%
2. Lack of internal manpower	24%
3. Reduce implementation time	19%

INTEGRATION PROJECTS AT COMPANIES SURVEYED



Source: *Computerworld* and ParaTechnology, Inc.

Who to choose?

Illustration by Greg Clarke

FINDING A SYSTEMS INTEGRATOR THAT MEETS YOUR EXPECTATIONS DEPENDS ON HOW WELL YOU KNOW THE DANCE STEPS.

By Alan R. Earls

A few years ago, Intergen Co. picked AT&T Corp. as its systems integrator, a decision that turned out to be anything but the right choice. "We worked with them for a little while," says Mark Sternefeld, Intergen's MIS supervisor. "When I asked a question, they would say they would get back to me, but they never did."

Indeed, service proved to be such a serious issue that the Purchase, N.Y.-based biopharmaceuticals company embarked on a series of relationships with other firms. Like many companies, Intergen discovered the hard way that picking a systems integrator is like picking a dance partner — it pays to choose carefully if you want to avoid missteps.

In Intergen's case, experience has brought the company full circle. "We are looking again at AT&T because they do have good technology," Sternefeld admits. Intergen also looked at Sprint Corp. and MCI Communications Corp.

Because so much is at stake in the relationship, it pays to define clearly what you want at the very beginning. A highly structured selection process, with good documentation and contracts, is the only guarantee of long-term success, insists Ioannis Kyratzoglou, a technical staff member at Mitre Corp. in Bedford, Mass.

As a government-funded research and development firm, Mitre has been both a customer of systems integrators (Unisys Corp., for example) and a middleman in arranging such services, Kyratzoglou says. That dual role, he says, has given him a lot of experience in choreographing the relationship between systems integrators and their customers.

Kyratzoglou recommends that companies detail their requirements and goals, have a clear idea of budget limits and, particularly important, possess a well-defined plan for sorting through vendors. "Then you should assemble a group of people, including lawyers, contract people and technical people, to review the candidates," he says.

There are literally hundreds of questions to ask systems integrators. Many are common sense: What is the company's financial and technical viability? How well does it follow processes? Is it usually on schedule? What is its technical approach?

BUYING EXPERIENCE

Even when a candidate survives every inquiry you can devise, it is still prudent to document expectations in detailed technical specifications. "We always try to do an in-depth project definition, and then we work with [the systems integrator] to fine-tune our needs," says Paul Maggio, MIS manager at Air Products & Chemicals, Inc. in Calvert City, Ky.

Maggio also looks at the integrator's experience. Currently, Electronic Data Systems Corp. is creating a maintenance and materials management system for Air Products that does everything from inventory control to billing and payroll. Part of the reason EDS got the business: "[It] had done this kind of project before with systems similar to ours," Maggio says.

Proximity is another consideration. Pete Battisti, a vice president of finance at Burleigh Instruments, Inc. in Fishers, N.Y., says a systems integration contract with Digital Equipment Corp. — replacing an outdated VAX-based manufacturing system with a LAN connecting 60 people — has worked well in large part because Digital's local office is only two miles away. "If they can't deal with something on the phone, they are here immediately," he says.

Similarly, Allen Tarbox Jr., director of MIS at the Bank of New Hampshire in Manchester, tossed out a highly regarded national firm when he needed to tie together a new Novell network, electronic-mail software and a number of banking-specific packages. He hired a small, local integrator that could provide the extra attention he demanded.

When the right ingredients are in place, a systems integrator can be a godsend. Tracy Freeman, manager of systems development at Cedar Rapids, Iowa-based Norand Corp., a maker of portable computers, credits Deloitte & Touche with "helping us pinpoint savings and see what the main business functions were that could benefit from new systems."

Says Tarbox: "When you rely on someone, you have to have a lot of confidence in them — confidence they have the right people." •

TIPS FOR SELECTING AN INTEGRATOR

✓**Communicate.** This can keep interpersonal or technical problems from becoming irreconcilable differences.

✓**Define the project.** Take time to plan and review your project's scope.

✓**Flexibility.** Leave room for flexibility if needs change or problems arise.

✓**Subcontracting.** Find out if the integrator will do the work or farm it out.

✓**Plan for change.** Evaluate and define a project's impact on the organization.

✓**Pay for what you get.** Don't pay for a project based on time and materials. Pay for systems that work.

✓**Size.** Make sure the integrator is big enough for your project and has offices convenient to you.

✓**Reputation.** Place a premium on firms with strong reputations. Ask other IS organizations who they recommend.

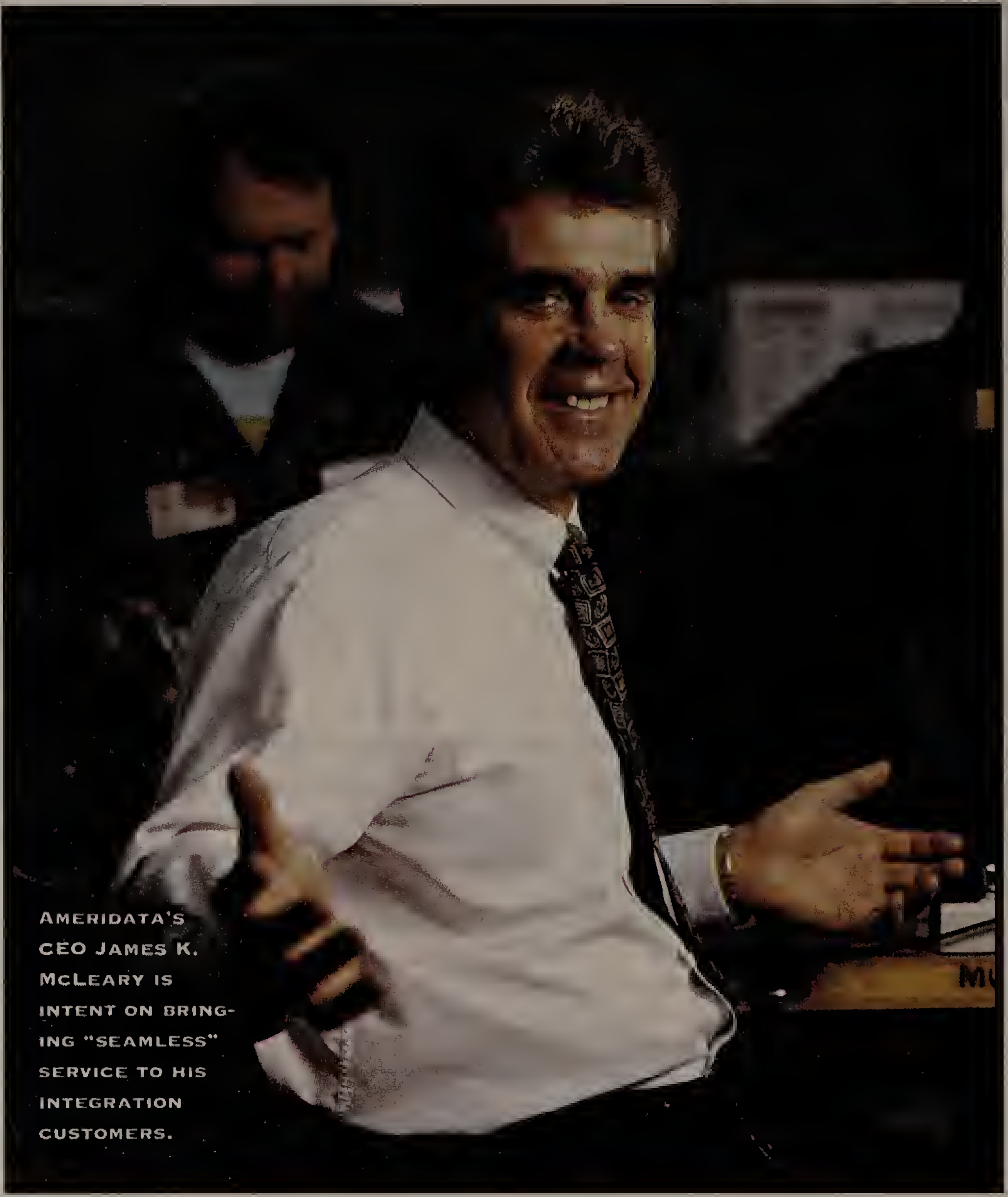
✓**Leadership.** Find an integrator that can provide a strong project manager.

✓**Experience.** Look for integrators with hardware and software know-how.

Earls is a freelance writer in Franklin, Mass.

AmeriData Technologies, Inc.

GROWTH THROUGH ACQUISITION AND A SMART BUSINESS MODEL BOOST THIS VALUE-ADDED DISTRIBUTOR *CUM* INTEGRATOR INTO THE TOP SPOT.



AMERIDATA'S CEO JAMES K. MCLEARY IS INTENT ON BRINGING "SEAMLESS" SERVICE TO HIS INTEGRATION CUSTOMERS.

1994 TOTAL REVENUE: $1,018,545,000
1994 INTEGRATION REVENUE* (SERVICES ONLY): $69,500,000
INTEGRATION EMPLOYEES: 882
LARGE COMMERCIAL CONTRACTS: SAMSONITE CORP.(DENVER), NALCO CHEMICAL CO. (NAPERVILLE, ILL.)
TOPS THE CHARTS: FLEXIBILITY, EASE OF USE, OVERALL QUALITY, COMPLETION TIME, FINAL PRICE VS. BID, EASE OF DOING BUSINESS
CHARACTERISTICS: BOTTOM-UP INTEGRATOR, 10,000 INTEGRATION CLIENTS
*NORTH AMERICAN

1

To say AmeriData is growing is like saying the Internet has generated a *little* interest lately. From 1992 revenue of just over $64 million, the company topped $1 billion in 1994 — that's a 300% growth rate a year. Revenue projections for 1995 hover around $1.5 billion.

Much of that growth is due to the company absorbing some 30 independent companies, including consultants, value-added resellers and distributors. Founded in 1968, the company has offices in 130 cities around the world. In the U.S., 70 offices house AmeriData's six distribution centers, 600 salespeople and a total of 2,300 employees, including almost 1,000 consultants, engineers and technicians. Last year, the company acquired part of Control Data Systems, Inc.'s international business for $34 million, opening new integration opportunities overseas.

"The company is built on a regional business model," says Lee Stagni, AmeriData's vice president of marketing. "Within the regions, we offer configuration integration for our customers as well as higher level consulting — both are driven from the field."

AmeriData's business model has a decidedly protective bent. While most organizations welcome the flexibility and freedom made possible by the PC, they also pine for the old days when a single big vendor — IBM, for example — handled all the details, says CEO James K. McLeary. "It's that seamless experience that we are trying to bring back for our customers," he says, "while also giving them the freedom of an a lá carte menu."

VENDOR OF CHOICE

AmeriData's philosophy and capabilities made a convert of Deborah Hirsch, staff assistant for technology at First National Bank of Maryland in Baltimore. "They have become our vendor of choice for all hardware procurement," she says. "They also provided an integration process for our servers and workstations across 180 locations."

Hirsch uses words like "flexible," "thorough" and "sensitive" to describe AmeriData's performance. "I don't have to give them detailed instructions, because they know what we will want when we decide to upgrade a site." When AmeriData did First National Bank's file-server rollout, for example, "it was accomplished without any First National people, and they achieved a 96% accuracy rate."

Of course, the approbation is not universal. A CIO at a regional hospital in the Mid-Atlantic States says that his satisfaction with integration work performed by an independent organization that was acquired by AmeriData in April 1995 has dropped. "The service has gone downhill," he says. "We used to get phone calls returned, but now we are a small account, and we are getting short shrift."

While defending its successes, AmeriData admits that melding tiny companies into a coherent whole — and continuing to grow rapidly — hasn't been easy.

But even though a few problems have arisen during the company's massive acquisition binge, many have been avoided, insists Steve Stringer, executive vice president of sales and service, and the man responsible for acquiring and integrating most of AmeriData's business units. "Rather than picking up companies in trouble," he says, "we always looked for successful companies with strong management that fit our business model."

"The key," Stringer adds, "is our regional business model. We don't want a billion dollar corporation dictating how you do business in a regional market. We encourage entrepreneurial flexibility."

THE OTHER SIDE

While many of AmeriData's clients know it first as a systems integrator providing business process re-engineering, database design, project management and training, there is another side to the company — what one analyst dubs its "single-tier distribution strategy."

AmeriData has developed a nationwide computer and peripheral distribution business, with regional distribution centers and $100 million in inventory at any time. "If you look at the value chain, we begin with product fulfillment where the value-added is low," Stagni says. "Then we build value-added on top of that. In growing our company, we have looked for acquisitions that fit that model."

The early acquisitions, Stagni notes, were mostly value-added resellers with turnkey specializations, often in networking. Next came integrators with individual businesses in the $100 million to $200 million range. The most recent wave of acquisitions, he says, involved "dealer-based systems integrators" and "some pure network and service firms."

The challenge now, Stagni says, is to provide "intellectual capital" to overseas operations to ensure they grow to their full potential as value-added service providers. •

—*Alan R. Earls*

Photo by Steve Woit

Unisys Corp.

2

Even though it sells hardware, Unisys focuses on delivering solutions.

While still a purveyor of hardware and systems, notably in transaction processing and scalable multiprocessors, Unisys Corp. is seeing most of its growth in services, including consulting, outsourcing, business process re-engineering, and systems integration. Indeed, in recent years, the company's systems integration business — both governmental and commercial — has grown at a rate of more than 40% annually, accounting for $1.3 billion, or 65% of information services revenue.

"Since we have been the largest supplier of systems integration services to the U.S. government for the past 25 years, we are used to working with other people's equipment," says Paul McGuire, principal, systems architecture, in the Unisys Information Services Group. (In the spring of 1995, Unisys sold its government defense operations to New York-based Loral Corp. And last month, Unisys reorganized into three separate business units: information services, computer systems and customer services.)

Systems integration services — from multivendor integration to solutions development, outsourcing, consulting, and training — are offered through the Unisys Information Services Group's Worldwide Information Services division. "People are sometimes concerned that we will try to sell them everything that has a Unisys label on it, but this independent structure ensures that won't happen," insists Bob Tumanic, managing principal, who is responsible for Unisys' systems integration practice worldwide.

Indeed, says Gregory S. Merth, IS manager at Tru-Part Manufacturing Corp., in St. Paul, Minn., and a Unisys integration customer. "They seem to be only interested in finding the solution that fits."

Merth says Unisys' hardware savvy showed through. "They put together a proposal and outlined a budget that they never deviated from. With other integrators, the price seemed to go up and up."

Frank Elvin, operations manager at Elvin Safety Supply, Eden Prairie, Minn., is another satisfied customer. In particular, he credits Unisys with helping him make the most of existing resources in designing and implementing a new LAN- and WAN-based architecture throughout several company locations.

However, while Elvin says he would consider using Unisys again, he tempers his praise with a few qualifiers. "Implementation," he says, "dragged on and on" and the company annoyed him when it simply refused to install equipment linking executives' home-based offices to the WAN. "Maybe I wasn't their biggest customer," he muses.

"Our heritage is doing business with the bigger transport and public sector organizations," Tumanic admits. However, he adds, "as a service provider, we are working hard to go beyond that." •

—Alan R. Earls

BOB TUMANIC

1994 TOTAL REVENUE: $5,978,200,000
1994 INTEGRATION REVENUE* (SERVICES ONLY): $302,400,000
LARGE COMMERCIAL CONTRACTS: NASDAQ STOCK MARKET (NEW YORK), FORD MOTOR CO.(DETROIT), NATIONWIDE MUTUAL INSURANCE (COLUMBUS, OHIO)
TOPS THE CHARTS: PERSONAL RELATIONSHIPS, INNOVATIVENESS
CHARACTERISTICS: 60,000 INTEGRATION CLIENTS, 32% OF INTEGRATION BUSINESS IS NORTH AMERICAN
*NORTH AMERICAN

Hewlett-Packard Co.

3

Hardware and integration go hand in hand at HP.

Unlike some of its hardware brethren, Hewlett-Packard Co. freely admits close ties between its systems integration and hardware businesses.

"It would be pretty unlikely that we would go after a project where there was no HP product content," says Glenn Osaka, general manager of HP's professional services organization, which is based in Mountain View, Calif.

"We are biased to HP technology," Osaka admits, "but one of the advantages is that customers can see our bias. There are firms that say they are [product] independent, but in fact, they have biases."

HP's key vertical markets are manufacturing, telecommunications and financial services; it has a more limited presence in about a dozen other markets ranging from health care to education.

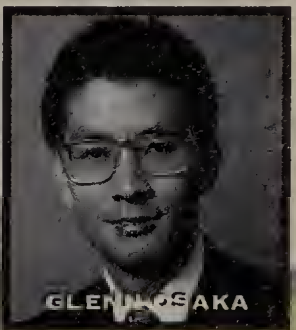
John Comish, manager of microwave products at the ITT Gallium Arsenide Technology Center in Roanoke, Va., confirms HP's skill in the manufacturing market. The wafer fabricator, which is already a heavy user of HP equipment, hired HP to create an integrated manufacturing system that will tie together islands of automation. The $3 million project is expected to take 2½years; installation began in May 1995.

"A couple of times, HP said things we didn't want to believe, but later we had to admit they were right on the money," Comish says. In the networking and database arena, for example, HP recommended a master database, while ITT was working with several databases that did not talk to each other. "HP made it perfectly clear to us that we were creating work by having separate database and data collection systems — work that in some cases was invisible to management," he says.

A medical customer, St. Mary Hospital in Hoboken, N.J., also was pleased with the company's service. HP installed two HP 9000 Unix workstations a year ago and helped the hospital share medical, financial and administrative data with St. Francis Hospital in Jersey City, N.J., over a T1 line using X.25 packet switching.

"HP assisted us in the installation of their Unix operating system and the X.25 hookup and made communications go smoothly between the two hospitals," says John Servello, PC LAN coordinator at St. Mary. "We actually went live with no problems, and it was done on time." •

—Steve Alexander


GLENN OSAKA

1994 TOTAL REVENUE: $25,000,000,000
1994 INTEGRATION REVENUE* (SERVICES ONLY): $903,000,000
INTEGRATION EMPLOYEES WORLDWIDE: 5,000
LARGE COMMERCIAL CONTRACTS: WEYERHAEUSER CO. (TACOMA, WASH.), GENERAL ELECTRIC CO. (FAIRFIELD, CONN.), FOXMEYER HEALTH CORP. (CARROLLTON, TEXAS)
TOPS THE CHARTS: TECHNICAL FEATURES, BUSINESS BENEFITS, SERVICE AND SUPPORT
CHARACTERISTICS: SPECIALIZES IN MANUFACTURING AND TELECOMMUNICATIONS CONTRACTS
*NORTH AMERICAN

Control Data Systems, Inc.

4

From mainframe maker to systems integrator, CDS gives an old name a new image.

A 3½-year-old start-up with a 39-year history. That's how Control Data Systems, Inc., describes itself.

A mainframe maker since 1957, the former Control Data Corp. was threatened with being left behind in the 1980s by the shift to desktop computing. In 1992, it split into two businesses: Ceridian Corp., an information services company, and Control Data Systems, Inc. (CDS), a systems integrator.

Plans for CDS's future revolve around the desire to be a leader in integration solutions for electronic commerce and product-data management. "If we focus on those areas, we can clearly be in the top two or three [integrators] in the country based on revenue," claims James Ousley, CDS's CEO.

In the product-data management market, for example, CDS developed Metaphase, a data management software product, which has enabled Swedish telecommunications manufacturer Ericsson SpA to run production around the clock and around the world. Ericsson controls all data and tools in product development by using Metaphase 2 and an "Ericsson layer." This added layer allows for communication with the system in terms familiar to Ericsson, says Jan Johansson, Ericsson's executive project leader.

At the start of the relationship between CDS and Ericsson in early 1995, "we initially were not very happy with the consultancy offerings from CDS, but the situation has improved considerably. At this stage, we are fairly satisfied with their performance," Johansson says.

Ericsson is looking to assign other subprojects to CDS.

Mervyns California is more than satisfied. The department store company hired CDS to remove old point-of-sale terminals and install new ones. The integrator also configured hubs, programmed terminals and integrated new scanners into the terminals.

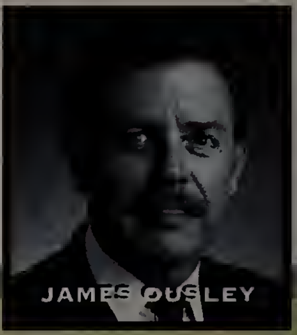
"We were very happy with Control Data," says Paul Weiler, Mervyns' manager of network support. "There were just a minimal number of things that went wrong, and the same thing never went wrong twice."

After completing the project for Mervyns, CDS asked Weiler what they could do to improve. "I was at a loss for words," he says. "I said I couldn't think of anything they could have done differently."

The past three years, however, have not been without some growing pains. In 1993, when CDS acquired Evernet Systems, Inc., Sun Diamond Growers of California suffered when the integrator installed a LAN. "They did things haphazardly, and we've been paying for it for over a year," says Lawrence DeBerry, director of internal audit at Sun Diamond Growers.

"We have really moved away from the LAN integration business and more into the solution business, so there probably were some issues with some of those customers," Ousley explains. •

—*Amy Malloy*


James Ousley

1994 Total revenue: $524,200,000
1994 Integration revenue* (services only): $70,697,860
Integration employees: 2,100
Large commercial contracts : Norwest Mortgage (Minneapolis), Fleet Bank (Providence, R.I.), Dow Chemical (Midland, Mich.)
Tops the charts: Aggregated business practices
Characteristics: 60% of integration business is international
*North American

USConnect, Inc.

5

A family of independent integrators extends the reach of USConnect.

When Chicago-based Superior Graphite Co. needed to install local-area and wide-area networks, USConnect, Inc., was the obvious choice. Because 85% of its projects involved PC LANs, USConnect had the necessary experience.

It was one of those no-fuss, no-muss type of deals, according to Ron Pawelko, Superior Graphite's treasurer. "I call up and say, 'What kind of hardware do I need?' They tell me, they bring it in and it works."

USConnect, based in Stamford, Conn., is a partnership formed in 1989 by five independent LAN integrators. "They [came together] so they could leverage each other's skills sets and fulfill multisite engagement contracts," explains Brad Whinney, vice president of marketing and business development at USConnect. The company's largest business is in LAN/WAN design and integration.

Every USConnect company, though, does not provide the same services. Some focus solely on systems integration, without offering education services. Others supply strictly application development services, but LAN/WAN remain common denominators in the majority of firms, Whinney says.

Today, the USConnect family includes 26 member firms covering 53 metropolitan areas in the U.S. and Canada. USConnect approached companies in various cities, which then purchased shares to join the USConnect consortium. Each company uses the USConnect name in conjunction with its own name or a city name. Member companies pay monthly dues in exchange for access to the services of USConnect and fellow members, Whinney explains.

USConnect's reach and expertise made sense for Legal Copies International, Inc. of Atlanta. It hired the integrator to install products such as Netware SFT III from Novell, Inc., build servers and install other software at locations in more than 20 cities.

USConnect impressed Legal Copies with its knowledge of Novell's Netware 4.1 and its willingness to share its expertise with Legal Copies' IS staff, explains Todd Pennington, wide-area systems coordinator at Legal Copies.

There were some problems, too. "We've had our occasional disagreements," Pennington admits. "At times, there has been a lack of speedy response to what we perceive to be emergencies."

USConnect knows that such disagreements generally can be resolved by approaching customer relationships with respect. "The thing that we're focusing on is making sure that [the customer] understands that we are there to support the IS department, and we are not out to compete with them," Whinney says.

Pawelko at Superior Graphite agrees: "They taught us how to set up the factory in Chicago, and we went in and set up the other factories on our own." •

—*Amy Malloy*

Brad Whinney

1994 Total revenue: $216,000,000
1994 Integration revenue* (services only): $80,676,000
Integration employees: 1,350
Large commercial contracts: Sprint Business (Kansas City, MO), ELF Technology (Mercer Island, Wash.)
Tops the charts: Project's compatibility, integration experience, final price relative to performance
Characteristics: Bottom-up integrator, 83% of business is North American
*North American

"I don't think [CSC] understood our expectations as well as they should have," says Lester Thierwechter of Baker & Taylor, Inc.

BIG britches

WHY DO THE LARGEST SYSTEMS INTEGRATORS IN THE BUSINESS RANK RELATIVELY LOW IN CUSTOMER SATISFACTION?

By Julia King

Big is by no means best when it comes to choosing a systems integrator. That's the consensus of customers of some of the billion-dollar integration firms, including Andersen Consulting, Computer Sciences Corp. (CSC) and Electronic Data Systems Corp. In *Computerworld's* customer satisfaction survey of 25 systems integrators, all three companies consistently ranked below their competitors across a range of satisfaction criteria.

Curiously, though, many users who have complaints about these big integrators say their companies probably would hire the same firm again. The reason? Corporate politics.

"It's a golf-course business," insists Tim Bourgeois, an analyst at International Data Corp. in Framingham, Mass. The largest integrators "can all reference big deals that have worked out. So in the end, what it all comes down to is relationships."

For example, when one of the Big Six is involved in an auditing project at a client company, the company's financial officer frequently will lobby the CEO or another top decision-maker to use that firm on a systems integration project.

Another touchy issue, according to users, is that top executives' reasons for choosing an integrator often are different from business users' and IS staffers' reasons. Executives, some users say, tend to focus more on strategy and business plans, while users want to know about an integrator's specific skills and its ability to transfer those skills.

Conflicts occur — sometimes deep ones — between customers and the largest of the large systems integrators as projects progress. Specific criticisms raised by users include the following:

- A lack of technical expertise on the part of individual consultants.
- Inflexible project management methodologies.
- Inadequate knowledge transfer or user training.
- Continuous expansion of project scope.
- Inadequate understanding of customers' expectations and requirements.

Consider the case of Baker & Taylor, Inc., a $600 million book distributor. The Bridgewater, N.J., company is re-engineering its core business systems in a $20 million to $30 million contract with CSC in El Segundo, Calif., one of the largest systems integrators in the business.

As of November 1995, what was supposed to be a

Continued on page SI/8

> "We thought we were hiring expertise, but we were paying them ... to become trained."
>
> *Mike O'Connor, University of Colorado Hospital Authority*

Photo by John Rae

On big jobs, "there is a hell of a lot more opportunity to make someone less than thrilled with you."

Robert "Skip" Savoia, Computer Sciences Corp.

Continued from page SI/7

15-month implementation of a new mainframe-based on-line order and distribution system was complete, but "a year late and over budget," says Lester Thierwechter, manager of systems programming.

What went wrong? Among other things, missed project deadlines and cost overruns. CSC's failure to heed the advice of internal IS staffers was another sore point. Thierwechter says that CSC insisted the packaged software application would meet Baker & Taylor's design requirements, for example, even though an internal study by the company's IS group had reached the opposite conclusion. "I don't think they understood our expectations as well as they should have," he says.

In another case, CSC took far too long to lay out precisely what is and is not included in a project, according to a vice president at a $250 billion Midwest manufacturing company. The manufacturing-company had recruited CSC to build a new order-management system that would be tightly integrated with a credit system CSC already was building for the company. But the order-management system was never completed.

Instead, the vice president says, what his company received was a comprehensive report on the state of systems already in place. This was issued after what he calls a months-long "map-and-gap" process. This involved CSC "looking at the whole enterprise because the [new] order-management system had what we call 'hoses' to 40 other systems and they would have to build those integration links."

What's more, the vice president complains, the customer "gets the pleasure of paying [CSC] $1,000 a day" during the study process. "You're bleeding to death, and you don't know when the map-and-gap will end. Finally, you get sick of it and terminate [the contract]," he adds.

For what he insists are "political reasons," CSC is still working with the company on a software development project that does not include systems integration. (For this reason, the vice president requested that his name and the name of his company be withheld.)

The idea of building a new order management system also got the ax. Instead, the company bought Oracle Corp.'s client/server financial applications, which Oracle modified for the company.

THE COST OF COMPLEXITY

Robert "Skip" Savoia, CSC's vice president of industry practices, acknowledges that "there are a couple of truths" in the above examples.

But he also notes that larger integrators such as CSC are called in to work on some of the most complex projects, which are "more dramatic in scope" than those tackled by smaller firms. "When you look at the characteristics of that kind of engagement, you tend to have a longer period of implementation and a wider audience that you're interacting with, so there is a hell of a lot more opportunity to make someone less than thrilled with you," he says.

As for the need for up-front systems analyses, "you just can't slam-dunk a new system in," Savoia says. "There is an enormous hidden, built-in infrastructure that a company has built hooks into over 20 or 25 years. It's all spaghetti, and if you inadvertently interrupt a process, you could shut down a business."

Another oft-cited problem with large integrators is a lack of sufficient technical expertise in the systems and software they are hired to deploy.

Consultants with Andersen Consulting, for example, spent two years installing a clinical orders communications system at the University of Colorado's University Hospital in Denver. But for some of that time, the consultants were learning about the software on which they already were supposed to be experts.

"We thought we were hiring expertise, but we were paying them over $100 an hour to become trained along with the hospital staff," says Mike O'Connor, a telemedicine project manager with the University of Colorado Hospital Authority.

Keith Burgess, who is Andersen's managing partner of business integration, agrees that people need to be skilled for the tasks at hand. "But that doesn't mean that each project member from Andersen will be a veteran with 20 or more years of expertise in a particular subject area," he says. What each member will have is access to the appropriate expertise when it is needed.

LONG EVALUATIONS

Another frustration is the time and energy integrators spend in the evaluation phase of a project. Clarence Johnson, director of information technology at World Airways, Inc., a specialty airline based in Herndon, Va., experienced frustration with Electronic Data Systems back in 1991 and 1992.

"They would frequently want to go through a big study and come up with a proposal that might be inches thick, when we were talking about something that would not be all that large," he recalls. "Since then, we've used smaller integration organizations."

As is the case with many of its jobs, EDS got the World Airways work by expanding its presence beyond a project in progress at one of the airline's sister companies — a common EDS practice some users complain about.

EDS offers no apologies. "I will not make any secret of the fact that, over time, our relationship with a customer can grow," says Barry Sullivan, an EDS corporate vice president. "While we are [at a customer site], we'll take opportunities to sell. I'm not ashamed of that. It's our business."

In the final analysis, a user's willingness to rehire a large integrator does not appear to be tied to any one indicator of customer satisfaction or dissatisfaction. Instead, most seem to take a warts-and-all hiring approach that, for better or worse, continues to make the already big integrators even bigger. •

King is a Computerworld *Senior Editor, Client/Server Applications Software.*

CASE STUDY: EDS

CLIENT: World Airways, Inc., Herndon, Va.

THE PROJECT: Migrate several mainframe-based administrative systems, including accounting, sales and marketing and ticketing applications, to a client/server environment.

QUOTE: "The idea was for EDS to get the company started [on the new applications] and then they'd be handled by internal IS. EDS did train, but the training they provided was pretty skimpy."

— *Clarence Johnson, director of information technology, World Airways*

CASE STUDY: ANDERSEN

CLIENT: University of Colorado Hospital Authority, Denver

THE PROJECT: A $6 million project to implement an on-line clinical orders system.

QUOTE: "Some of [Andersen's] staff consultants had no experience with the products we were installing. We hired them to educate the hospital staff, not educate themselves. The advice I'd give other hospitals would be to rely as little as possible on outside consulting and to cultivate skills and provide education and training for your own staff to successfully manage projects."

— *Mike O'Connor, telemedicine project manager, University of Colorado Hospital Authority*

HOW THE BIG GUYS RANK
HARDWARE VENDORS RATE HIGHER IN CUSTOMER SATISFACTION

LARGEST 5 HARDWARE VENDORS	Total North American integration revenue	Total integration revenue	Relative customer satisfaction (rank among 25 firms)
1. IBM Corp.	$6B	$9B	14th
2. AT&T	$1.05B	$1.75B	12th
3. Digital Equipment Corp.	$1B	$2.24B	7th
4. Hewlett-Packard Co.	$903M	$1.81B	3rd
5. Unisys Corp.	$302M	$1.26B	2nd

LARGEST 5 NON-HARDWARE VENDORS	Total North American integration revenue	Total integration revenue	Relative customer satisfaction (rank among 25 firms)
1. Electronic Data Systems	$7.37B	$9.96B	22nd
2. Computer Sciences Corp.	$2.27B	$2.58B	25th
3. Andersen Consulting	$1.68B	$2.40B	24th
4. SMS Corp.	$435M	$550M	15th
5. Ernst & Young	$410M	NA	19th

Source: *Computerworld* and ParaTechnology, Inc.
Note: Companies ranked by total North American integration revenue. See pages SI/17 to SI/19 for details.

More than just hardware

By Steve Alexander

Technical expertise. That's the reason companies hire hardware vendors for systems integration projects, according to *Computerworld*'s systems integrator customer satisfaction survey. Unisys Corp. and Hewlett-Packard Co. ranked high in overall customer satisfaction, Digital Equipment Corp. and AT&T Corp. scored in the top half of the field of 25 integrators, and IBM came in at No. 14. (See chart on previous page.)

HARDWARE VENDORS GET HIGH MARKS FOR THEIR PERFORMANCE, BUT SUCCESS DEPENDS ON THE CUSTOMER.

But a project's success depends on more than technology, according to Malon S. Updike of Jefferson National Bank in Charlottesville, Va. The senior vice president of data systems says AT&T did exactly what it was asked, and if things didn't turn out right, it's the bank's fault for hiding its embryonic strategic plan from AT&T.

Jefferson National, which operates 100 branch banks in Virginia, hired AT&T Global Information Solutions (renamed NCR Corp. last month) to develop an Oracle database for the management of ad hoc financial reports. The problem was that the bank didn't share with AT&T its long-range plans for generating financial reports from branch banks hundreds of miles away at the click of a button.

"We didn't tell the systems integrator where we wanted to go, because we didn't want them to bid on all that," Updike confesses.

While the AT&T project turned out as requested, it didn't fit into the bank's evolving plan, irritating some bank executives.

The bank's concealment of its plans violated one of the key rules for making sure a systems integration project comes out right, says David Toub, Digital's worldwide strategic planning director for systems integration. That is: Make sure you have open communications with your systems integrator, because you're likely to get what you ask for.

DISAPPOINTED WITH IBM'S PERFORMANCE ON A THREE-YEAR PROJECT, STEVE MCNAUGHTON OF QUAKER STATE ADMITS HE SHOULD HAVE LOOKED FOR AN ALTERNATIVE SOONER.

A customer needs to define carefully a project's goals and objectives to the integrator or risk winding up with hardware that doesn't do the job. And, the customer needs to follow up on the integrator's promises or the project may spin out of control.

That's what happened at Quaker State Corp. when IBM was hired to install an AS/400 and integrate it with laboratory information management system software for Quaker State's Innovation Center, an oil-testing lab in Oil City, Pa. But Steve McNaughton, the center's systems operator and network administrator, says IBM couldn't find any appropriate software, so it recommended development tools instead. Trouble was, none of the tools worked satisfactorily, and Quaker State finally gave up on the 3-year-old project last spring and turned to a network of PCs.

IBM was paid for the project, but McNaughton learned Quaker State shouldn't have let the project continue for so long without results. He should have looked for an alternative solution sooner.

Hardware was not the issue for Kaiser Permanente, the Oakland, Calif.-based hospital and medical clinic operator, when it tapped Unisys for a 14-state electronic-mail system. "We relied on none of their hardware, but rather on their skills in configuring other parties' hardware," says Gary Wilkerson, a Kaiser senior planning analyst based in Atlanta.

Execution was smooth because the scope of the E-mail project already was defined when Unisys arrived on the scene.

Often, however, defining a project's scope is not enough. The California Department of Fish & Game had to spend time educating its integrator, Hewlett-Packard, on how to handle a geographic information system (GIS) database project.

The idea was to update information on the distribution and condition of fish and other wildlife throughout California in a GIS that would be used to respond to oil spills. Since the department already was standardized on HP equipment, the integration project fell to HP, too.

"Most [hardware] vendors don't have much experience with GIS applications," says John Ellison, GIS manager, California Department of Fish & Game.

Ellison identified the key HP contact person and has worked with that individual for most of the project. "So far, we've had no surprises," he says.

Hardware is often the reason for signing a contract, but other factors are responsible for success. ▪

Alexander is a freelance writer in Edina, Minn.

Photo by Mark Bolster

Top-Down vs. Bottom-Up

Top-down:/ˈtäp-ˈdau̇n/ *adj* 1.integrators that are driven by boardroom decisions and focus on management consulting, applications development and facilities management

Bottom-up:/ˈbä-təm-ˈəp/ *adj* 1.integrators that are driven by new technology and focus on nuts-and-bolts implementation projects

IF ALL YOU NEED IS DEPENDABLE TRANSPORTATION, YOU DON'T BUY A ROLLS-ROYCE. SO WHEN YOU NEED HELP ON AN IS PROJECT, WHY SHELL OUT THE BIG BUCKS FOR A HIGH-PRICED CONSULTANT?

By Steve Alexander

When Kevin O'Byrne went looking for a systems integrator, he knew better than to pick one of the big guys.

"We needed someone to acquire equipment, test it, configure it to our specifications, ship it to the locations and install it," says O'Byrne, manager of branch automation at First Interstate Bancorp. in Los Angeles, which was acquired last month, pending regulatory and stockholder approval, by Wells Fargo & Co. "They didn't have to have any understanding of the development of the applications."

First Interstate picked MicroAge, Inc. of Tempe, Ariz., because it was allied with Compaq Computer Corp., the bank's hardware vendor, O'Byrne says. With offices in 13 states, from Texas to Alaska, First Interstate is using MicroAge to put office and sales automation applications on LANs in 450 branch banks. Plans to put them in 450 additional branches are on hold, pending the bank's acquisition.

When bids were taken, O'Byrne liked MicroAge for its hardware integration and project management capabilities, and because MicroAge offices are located close to the bank's branches. He attributes the project's success to the bank's careful outline of the project's scope: "We spent quite a bit of time and went into detail laying out the responsibilities of the integrator. We had a good, crisp understanding of who was doing what, and it served us very well."

WHY BOTTOM-UP?

Systems integration projects that don't involve business process re-engineering or corporate strategy often go to value-added resellers that also do integration work, such as MicroAge. While profit margins are typically lower for these "bottom-up" integrators, the firms play in a broad market, ranging from modest PC configuration to integrating office systems, such as First Interstate's project.

The difference between the two approaches is focus, insists Chris Koziol, president of MicroAge Infosystems Services, a subsidiary of MicroAge, Inc. Top-down companies focus on consulting, applications development and, in some cases, facilities management, while bottom-up firms focus on implementation.

"Bottom-up integrators often specialize around a piece of hardware, are allied with a hardware vendor or use only a limited number of vendors," says Carl Sellberg, a partner responsible for domestic IT work at New York-based Coopers & Lybrand. Top-down integration, he says, is driven from the boardroom, while bottom-up integration typically is driven by new technology.

Which way's up?

On average, customers are most satisfied with bottom-up integrators, with the "both" category coming in a close second. Satisfaction is driven, in part, by the type, duration and size of the project; the larger the project, the more chance of problems.

(Numbers correspond to the company's rank in overall customer satisfaction level. See page SI/17 for details.)

BOTTOM-UP	TOP-DOWN	BOTH
1. AmeriData Technologies, Inc.	4. Control Data Systems, Inc.	2. Unisys Corp.
5. USConnect, Inc.	6. Price Waterhouse	3. Hewlett-Packard Co.
9. The Future Now, Inc.	8. Deloitte & Touche	7. Digital Equipment Corp.
10. MicroAge, Inc.	13. Cap Gemini America, Inc.	12. AT&T Corp.
11. Entex Information Services	15. Shared Medical Systems Corp.	14. IBM Corp.
16. Vanstar Corp.	18. Coopers & Lybrand	22. Electronic Data Systems Corp.
17. Inacom Corp.	19. Ernst & Young	
	20. American Management Systems, Inc.	
	21. KPMG Peat Marwick	
	23. SHL Systemhouse, Inc.	
	24. Andersen Consulting	
	25. Computer Sciences Corp.	

Source: *Computerworld* and ParaTechnology, Inc.

Often, the two types of integrators collaborate, adds Tim Wallace, vice president of professional services at The Future Now, Inc., a bottom-up service provider based in Cincinnati. Top-down firms sometimes outsource tasks such as desktop life-cycle management — buying, supporting and eventually replacing desktop PCs — to bottom-up firms.

"It's easier to move up the value chain than down it," claims Tom Martin, senior vice president of services at Entex Information Services, a bottom-up integrator based in Rye Brook, N.Y. "Our market is hard for [top-down integrators], because it has low margins and requires a lot of training, certifications and skill sets that are not in their organizations. They must invest in that to get lower margins than they get today, while, as we move up, we get higher returns."

DEVIL IS IN THE DETAILS

Not all customers, however, are as careful as O'Byrne. Jeffrey Bartels, IS project manager for Harmon Glass, a subsidiary of Apogee, Inc., based in Golden Valley, Minn., says he ran into trouble on an integration project with Entex precisely because he didn't specify the details of the job in advance.

Harmon Glass, which operates 270 auto-glass shops nationwide, asked Entex to recommend a way to implement a remote communications feature that would run on Windows for Workgroups at a suburban Minneapolis location. When technical problems arose, Entex was called in, but the results weren't satisfactory. Harmon and Entex agreed to split the bill for Entex's services. "We should have set some guidelines, and we didn't do that," Bartels says.

Again, when Harmon hired Entex to install an E-mail gateway to link its Minneapolis and Orlando, Fla., offices, the E-mail gateway became operational on schedule, but a problem in synchronizing user lists took several more weeks to resolve.

"I love Entex for equipment purchases, but I was dissatisfied with their systems integration," Bartels says. "I'd have a tough time going back to them."

TAKE CHARGE

A bottom-up integrator is often a partner who will take charge of a project and make life easier.

Under a three-year, $15 million contract that began in January 1995, MicroAge consolidated work that credit-card firm Visa International of Foster City, Calif., formerly had done by three companies.

Hal Rhineberger, director of Visa's acquisitions planning, says he picked a bottom-up vendor to buy, configure, test and ship IBM PCs with Visa software to banks in 42 countries, "because I was looking for nuts-and-bolts building, not planning and consulting."

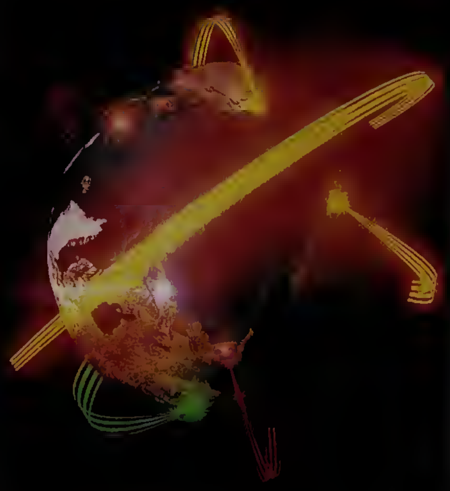
The bottom line, says O'Byrne of First Interstate, is to know what kind of integrator you need. "We needed a bottom-up, hands-on integrator." •

Alexander is a freelance writer in Edina, Minn.

Step By Step: Price Waterhouse, Business, Industry, and Technology Over the Decades

How We Got From There

To Here In Little More Than A Half Century...



Price Waterhouse LLP
Management Consulting Services

Business, Industry, Technology Evolve...

1940s

Big Boom

1943: U.S. Army funds a $400,000 electronic computer to calculate paths of artillery shells. The Electrical Numerical Integrator and Computer (ENIAC) occupies a 30′ by 50′ room, weighs 30 tons, uses 18,000 vacuum tubes — but computes 1,000 times faster than any other device.

Economic Boom

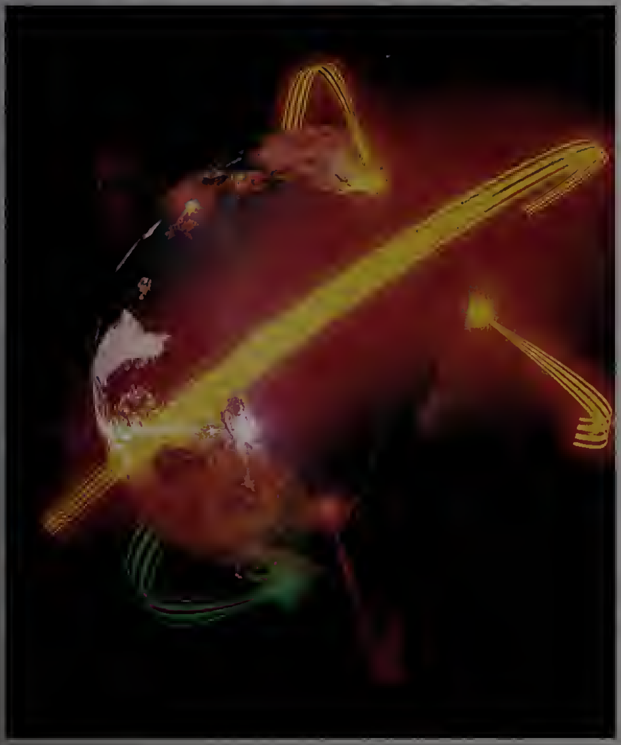
1945: With war's end, U.S. manufacturers fuel a red-hot commercial economy. Price Waterhouse consults on strategy, operations. In a paper universe, card punchers, sorters, printers evolve — to be used well into the 60s. (The punched card, a turn-of-the-century Census Department invention, is the original computing paradigm.)

Sonic Boom

Business and industry soar. Price Waterhouse knows both. Now brings clients managerial advances from World War II and mechanizes accounting. The Systems Department begins to develop useful management tools.

Step by Step with Price Waterhouse

1990s



The Internet: Wave of the Future or CB Radio of the 90s?

A relatively obscure research and communications tool for academics and governments in the 60s — the Internet grows into a social and economic phenomenon. Zealots see on-line shopping as a major avenue of commerce. World Wide Web (WWW) service lets users send documents with text, graphics and sound. Some think it will replace client/server as the dominant computing paradigm; others that its a future footnote.

Merging and Downsizing

Global competition. A whole new game where time-to-market is key. Clients rework the supply chain — their vendors, tools, and materials — to bring best quality and value to market, on demand. Once-international companies now operate as global concerns — ready to source materials and operations in Peoria or Punjab. Tighter margins prompt widespread reengineering, mergers, and downsizing.

Object-oriented technology —
an end to the application backlog?

Photo by Tom Lippert

Enlightened Leadership

Price Waterhouse sharpens global delivery capabilities in Change Integration® and Information Technology. The market approves:

- Emerson Research Company rates Price Waterhouse in its 1995 "Big 6 Multinational Companies Client Satisfaction Study."
- *Information Week* recognizes Price Waterhouse as "a leader in Information Technology usage."
- *Computerworld* includes Price Waterhouse as the only professional services firm in "The 100 Best Places to Work."
- *PC Week* gives Price Waterhouse its Best Practices Award for KnowledgeView℠, a proprietary global data repository of more than 4,000 entries from sources around the world.

The Year 2000 and Beyond

1950s

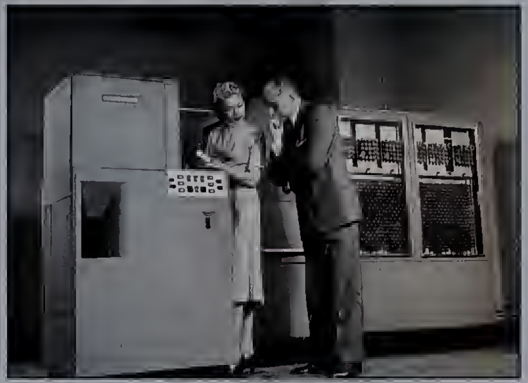
Computers and The Cold War

1950: U.S. government annually spends $17 million on computer R&D to build atomic bombs and improve guidance systems. Propels American leadership in computer field.

But British mathematician Alan Turing makes the software industry. His concept: a device with a recordable, erasable memory that stores — *in the computer, along with the data* — the instructions the computer is to execute. That coded instruction starts the evolution of "software." Grace Hopper writes a business-oriented language called FLOWMATIC, the foundation for COBOL.

Batches of Opportunity

Resource-rich, the United States becomes manufacturer and distributor to the world. Simple business applications involve lots of handwork and punch cards — commonly called 5081s. Batch processing makes management information available, as computers gain a role in manufacturing, logistics.



Inventing the Future

Learning to apply technology to retrieve vital business information, Price Waterhouse professionals study data processing techniques and tools. Many clients expand and diversify, their needs change and outpace available technology. The world waits for integrated circuits.

1960s

Bigger Industry — Smaller Footprint

Transistors replace tubes. IBM introduces the 360. New hardware, storage systems, circuitry, and communications revolutionize the industry. DEC launches first Program Data Processor (PDP), a new class of relatively small, inexpensive minicomputers. Five years later follows the PDP-8, the first mass produced minicomputer.

Mid 60s: COBOL appears. Certain to end the application backlog.
Late 60s: Databases appear. Organizing data will end the application backlog.

The No-Option Option

The manufacturing power on the planet, retooled U.S. plants continue to export. Companies buy computers, but turn to Price Waterhouse and others for implementation. Without computer schools or courses, vendors school their own workers. Offering limited hardware, operating systems, products — vendors dictate the applications companies use. Zero interoperability between systems. Once a company picks a vendor, it's locked in for life.

The T-bill rate hits 3% for the first time — no one expects to see that again.
IBM upgrades the 1401's memory from 4 to 16k — no one expects to use all that power.

Mastering New Technologies

Price Waterhouse hires programmers and systems analysts to design and develop better applications. Clients begin to rely on outside sources for technology needs as productivity requirements outstrip resources. (Sound familiar?)

1970s

Personal Computing

Miniaturizing electronic circuits, chips replace transistors. Computers get much smaller. The inexpensive "personal computer" remains a great concept, but early PC kits prove difficult to build, operate. INTEL founder Gordon Moore thinks silicone components will double in power, halve in price every two years. He's right. VISICALC and Lotus 1-2-3 bring software to the masses, not the targeted business user. Hardware and software garage start-ups join the PC revolution. The Apple 1 with a preassembled computer circuit board appears. DOS and UNIX appear. Real-time data processing comes on-line.

By mid-70s: 4GLs make it far easier to write code. Sure to end the application backlog.
By late 70s: relational databases promise to fix everything. Normalizing data will end the application backlog.

International Markets Lead

Economy softens as overseas manufacturers penetrate the U.S. market with innovative and inexpensive products. The 1973 Oil Embargo caps it with era of stagflation — a stagnant economy and roaring inflation. Information Systems spending — never a serious concern, now a major material expense — hits management's radar screen. Does IS pay its way? More than new systems, companies demand rational systems and better ways to manage the function. To complement existing services, Price Waterhouse adds deep skills in analysis, design, strategic systems planning.

Retake on International

Clients in virtually every industry ask the same questions: *Am I doing the right things? And am I doing those things right?* Answers grow more complex, as international competition begins in earnest. Price Waterhouse's international practice grows. Clients rely on services that span continents and share sophisticated skills to develop competitive strategies.

1980s

Technology and Software Explodes

The PC moves into the office and dominates the market with MS-DOS. Apple's Macintosh spotlights graphical user interfaces (GUIs). A whole new genre of human-computer interaction begins with point and select commands and options. Communications flourish with local-area networks (LANs) and wide-area networks (WANs). Faster PCs linked to mainframes and minis create larger, more powerful information networks.

Mainframes and minicomputers handle high-end computing. Comes the client/server revolution and an explosion in software. Independent software vendors offer huge range of applications that run on myriad mixes of platforms, operating systems, languages, databases.

Empowered Management

Economy shifts from manufacturing to services, from international to global. U.S. companies begin to consolidate — mirrored in computer industry shakedowns. Every player is new; mature vendors reinvent themselves or fail. High tech offers new ways to restructure business — and use information as a competitive tool. Executives gain control with desktop information systems.

CASE tools. Absolutely will end the application backlog by mid-decade.
Client/server architecture. Finally. Must end the application backlog.

Dynamic Markets

Price Waterhouse launches systems integration practice. Changes staffing profiles, training programs, methodologies — to lead in client/server. Adds vendor alliance program that sweeps market — why custom build when an off-the-shelf package may cover 80% of client needs? Adds industry specialists with in-demand business, process, technology skills. Price Waterhouse's leveraged software products for targeted vertical industries raise the bar.

An Information Society

From Internet to Global Village?

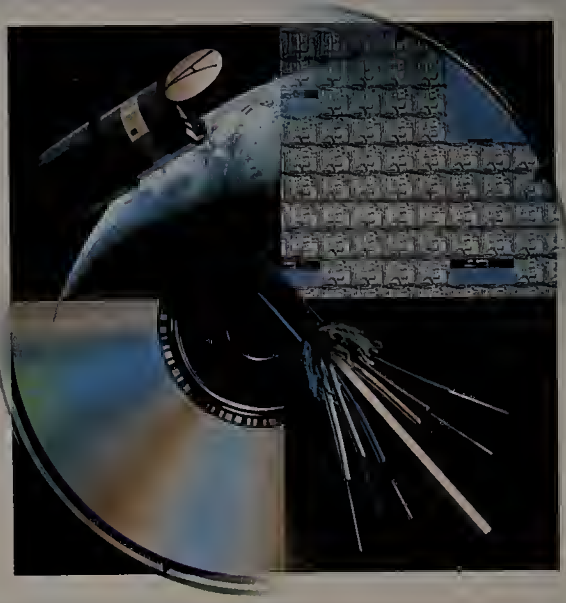
World-wide sharing of information. The Virtual Company eliminates offices and demands an overhaul of systems concepts. A revamp of the notion of stand-alone systems and independent computer environments. No one sits at an isolated desk — or even within a single company or organization. Workers must rethink how they connect, fit into the new world of altered business practices and communications

Rise of Electronic Commerce (EC)

Electronic Commerce will change how business manages existing functions. Electronic Data Interchange (EDI) will automate entire business processes — request for bid, shipping notice, payment will be conveyed electronically. Less paper, less cost. New forms of electronic commerce will go far beyond traditional EDI — such as those that reach out to the consumer via services on the Internet.

Wireless Computing

In the new world of technology, computers are in everyone's hands — and information can be accessed from any physical location. New portable computing devices and communication services are expanding wireless computing environments daily.



Technology Forecast:
1996

Back to the Future

Is the future predictable? It is at Price Waterhouse. In the business of looking forward, Price Waterhouse remains committed to our clients' future. Our professionals forge partnerships with clients to explore options and solve complex business problems. A simple, more than century-old tradition that continues to bring our clients and our firm success.

For more information about Price Waterhouse, visit our Internet World-Wide Web site: http://www.pw.com or call 1-800-792-7856.

© 1996 Price Waterhouse LLP. All rights reserved. All trademarks are property of the manufacturer.

Avoiding the D word

By Candee Wilde

A BREAKDOWN IN RELATIONS WITH YOUR SYSTEMS INTEGRATOR CAN BE MORE ACRIMONIOUS THAN A DIVORCE. HERE'S HOW TO KEEP THE PROJECT ON TRACK AND OUT OF THE COURTROOM.

A systems integration contract gone wrong has all the elements of a nasty divorce. Both sides inflict and endure pain; they lose sleep, money and time. It often takes time to pick up the pieces and start again.

Contracts between integrators and clients are complex, and relationships sour for the same reasons that married couples split up. Unrealistic expectations, lack of communication and a stubborn refusal to compromise can set off a domino effect that brings projects crashing down.

Take, for example, Electronic Data Systems Corp. In a highly publicized dispute late last year, EDS was accused of fraud and civil theft by Florida's attorney general, who is seeking to bar EDS from working in the Sunshine State. In a separate but related proceeding, an arbitrator has ruled that EDS is entitled to some $50 million in payment from the state for work on a state project.

Or take Andersen Consulting. It's embroiled in several lawsuits with former clients that have alleged fraud, incompetence and neglect. In some of these cases, Andersen is suing for nonpayment.

In Andersen vs. O'Neal Steel, Inc., O'Neal is seeking an award of $38 million, plus punitive damages, from Andersen in a suit filed in Birmingham, Ala., in September 1994. The suit claims the Chicago-based consultancy misled the Alabama steelmaker about the cost, duration and best method for redesigning its computer system to support re-engineered business operations.

One day before O'Neal filed suit in Birmingham, in what O'Neal attorney Anne B. Stone describes as "a race to the courthouse," Andersen filed suit in Atlanta, seeking fees and expenses it says are due under the contract.

"The project got behind schedule, and the number of hours O'Neal was estimated to have to devote was grossly underestimated," says Stone, a partner with Walston Stabler Wells Anderson & Bains in Birmingham. When the computer system was installed in O'Neal's Atlanta office, Stone alleges, "it did not work. It caused a complete business interruption."

O'Neal and Andersen tried unsuccessfully to address their differences. Bob Prince, Andersen's managing partner for partnership matters, says the contract called for Andersen to install the new system in all 23 of O'Neal's district offices. But because O'Neal stopped the project before it was completed, Prince says the real issue in the case is, "What would have happened to our contractual commitment if we had been allowed to continue?"

One of O'Neal's business objectives was to completely re-engineer its distribution system. However, "it was clear that a large number of people did not want to go through the changes that were required to make things work," Prince says.

When O'Neal made allegations that Andersen was in default on the contract, Prince says, it was clear to Andersen that the client relationship was broken and there was no longer mutual trust. "In that situation, we had to make a decision about how to best protect Andersen Consulting's interests," Prince says, which led to filing the suit to collect its fees.

TAKING PRECAUTIONS

Problems such as O'Neal's can be avoided.

Don't agree to pay for a project based on time and materials; pay only for systems that work. That nugget comes from Don Blumberg, CEO of D.F. Blumberg & Associates, a Fort Washington, Pa.-based consultancy that works with systems inte-

Continued on page SI/12

> "The best time to talk about conflict resolution is when both sides are interested in initiating the relationship."
>
> *Harry Glasspiegel, a partner in the Washington, D.C., law firm of Shaw, Pittman, Potts & Trowbridge*

Illustration by Elizabeth Lada

Avoiding

Continued from page SI/11

grators and other businesses to help develop business plans and improve productivity.

"Andersen rarely makes a fixed-price implementation," Blumberg notes. "They charge for time spent, not the results they produce. The effect is, they never get done." The practice is common, particularly if the scope of a project is not well-defined. EDS and others, such as Vanstar Corp. of Pleasanton, Calif., work on an hourly basis, too, he says.

Blumberg says clients must protect themselves against spending huge sums and having nothing to show for it. To do that, they must define exactly what they want, give a clear scope of the work and decide what the deliverables will be — then settle on the price they are willing to pay for the job.

BROKEN PROMISES

Andersen's Prince says some disgruntled clients ask for huge financial settlements when they sue, hoping to scare the integrator into an out-of-court settlement. A lawsuit filed by Universal Oil Products (UOP), a Des Plaines, Ill., engineering company that provides technology and products to build oil refineries, is a case in point, Prince says.

UOP has charged Andersen, which it hired in 1992 to streamline UOP's engineering specifications and cost-estimating processes and to develop client/server software applications, with breaking promises, incompetent and grossly negligent performance and "provision of defective and useless systems."

The contract was terminated in 1993, says Eugene Schmelzer, director of UOP's support center, "when we became convinced that Andersen was not going to be able to effectively complete it."

"[UOP] filed a lawsuit against us for $100 million, which is an absolutely preposterous amount," Prince says. "Our fees on the engagement were $8 million."

The suit, filed in May 1995, alleges Andersen "represented that it would 'assume responsibility for the price, schedule and quality of deliverables,' " and should "be held to those promises."

UOP has hired another integrator to continue the project and is "very happy with the relationship," Schmelzer says. UOP is working with the new integrator more effectively because "we have been able to set up a close relationship at the working level, not just at the management level."

In contrast, Schmelzer says, Andersen kept UOP personnel "at arm's length" during the project. UOP's suit alleges that in November 1992, Andersen estimated it would take 55,000 hours to finish developing UOP's cost-estimating system. By the next September, that estimate was 88,700 hours, the suit says.

UOP and Andersen might have avoided litigation if the precise goals of the project and the amount of time and money UOP was willing to invest had been agreed upon specifically up front. Consistent and frequent communication would have kept the air clear and tempers in check.

THE STATE OF FLORIDA VS. EDS

Bitter barely begins to describe the public dogfight that erupted several years ago — and is still going on — between EDS and the state of Florida. The sides have sued each other over an $88 million, three-year project initiated in 1989 to integrate Florida's various welfare payment systems.

In a suit filed in October 1995, Florida's attorney general charged EDS with fraud and civil theft, alleging that EDS built a computer system for the state's Department of Health and Rehabilitative Services (HRS) that it knew had inadequate capacity, delayed telling the department about the shortfall and then misrepresented the reasons for the problem.

The suit also alleges an EDS employee testified falsely before the state legislature to collect payment for the system. "Under Florida law, this spells F-R-A-U-D," says Steve Parton, a lawyer in the attorney general's office.

Tips on avoiding a lawsuit

1. **Pick the right solution and the right integrator.** You must have the right fit to begin with, because a contract will not protect you.
2. **Control the contract drafting process.** Take the lead in developing a contract that covers all aspects of your project.
3. **Be clear on all aspects of the job.** Specify performance obligations, deliverables, acceptance criteria and the like.
4. **Be specific on respective responsibilities.** For example, determine who is responsible for managing third-party software.
5. **Select key project managers on both sides.** Establish a format for project-management reviews and dispute resolution procedures.
6. **Know who you are hiring.** Get as much information as possible about key individuals the integrator plans to assign to your project team.
7. **Keep turnover low.** Contracts for long-term projects should include provisions to minimize turnover of key staff members.
8. **Be very clear about pricing.** Tie payments to deliverables and the achievement of specified milestones.
9. **Negotiate reasonable warranties.** Determine who is responsible for software maintenance and support.

Source: Harry Glasspiegel, a partner in the Washington, D.C., law firm of Shaw, Pittman, Potts & Trowbridge

But EDS calls these latest charges "frivolous" and says the state brought them only after a special master hearing, or arbitration, of EDS' nonpayment suit recommended that HRS pay EDS about $50 million.

The latest suit would not have been filed, Parton says, "if EDS had gone to HRS and said, 'The capacity problems are because we screwed up.' But it's not good for a big systems integrator like EDS to say, 'We didn't do our job. Even though we studied the design, we really didn't know how it functioned.' "

But an EDS spokesman says the courts have had some questions about "the expertise of some of the people at HRS to administer this type of contract."

The lesson, once again, is that a sense of partnership and shared goals is essential. Underlying the comments from both parties is the realization that better communication might have mitigated problems enough to have avoided legal action.

Fortunately, such complex legal snarls are rare and both sides have significant incentive to avoid them, says Harry Glasspiegel, a partner in the Washington, D.C., law firm of Shaw, Pittman, Potts & Trowbridge, which represents both integrators and clients in outsourcing systems integration contracting.

These transactions are among the most complex legal agreements companies can enter, short of a merger or acquisition. Too many times, Glasspiegel says, discussions of potential obstacles are glossed over.

"The best time to talk about conflict resolution is when both sides are interested in initiating the relationship and have incentive to establish fair and reasonable approaches to dealing with issues that might arise in the future," he says. "The success of these transactions is almost always in the details." •

Wilde is a freelance writer in Easton, Conn.

WHEN TEMPERS FLARE

THINGS OFTEN FALL APART BECAUSE NEITHER SIDE WANTS TO TALK. NOT SO AT AMS.

When Larry McNabb inherited a systems integration project that Bank of America's cash management department was working on with American Management Systems, Inc., things were not going well. The computer system wasn't delivering the promised results, and tempers were rising between personnel from AMS and the bank.

After the Bank of America group executive vice president saw what he was dealing with, he sat down with AMS vice chairman Patrick W. Gross in the bank's San Francisco office. McNabb told Gross he saw three options for the problem-plagued project: It could sink into a finger-pointing fracas, it could be terminated, or both sides could admit that mistakes had been made, forget about placing blame and try to work together as partners to straighten things out.

"I told him I'd rather be partners," McNabb says, "and he says he would too. That was in 1987, and we've been partners ever since."

Who is the best at problem resolution?

1. American Management Systems, Inc.
2. AmeriData Technologies, Inc.
3. Control Data Systems, Inc.
4. KPMG Peat Marwick
5. Price Waterhouse

Note: Systems integrators are ranked according to customer satisfaction survey results.

Source: *Computerworld* and ParaTechnology, Inc.

The lesson? Systems integrators who treat clients as partners and lay their cards on the table early and often are likely to head off "situations" before they become problems, says Paul A. Brands, AMS' vice chairman and CEO. "I don't think there's any magic associated with it."

AMS was voted tops by clients in problem resolution in *Computerworld*'s systems integration customer satisfaction survey. (See page SI/18.)

A practical step AMS takes to keep projects running smoothly is scheduling frequent meetings between senior AMS executives and the AMS project team assigned to a client. The client often participates in these meetings, which allow AMS to "identify major risks, potential problems and concerns either side might have. Often, we resolve problems before they come up," Brands says.

The moral of this story: An ounce of prevention is worth a ton of cure.

— Candee Wilde

a wild ride

BEWARE WHO YOU CONTRACT WITH WHEN YOU GO SHOPPING FOR AN R/3 INTEGRATOR.

Rosemary Cafasso

Joyce Young, director of information technology and services at Tellabs, Inc., a telecommunications products manufacturer in Chicago, put her signature on a SAP AG software contract at 4 p.m. Thursday, September 28.

When she got to her desk at 9 a.m. Friday morning, she had 15 voice-mail messages from systems integrators looking to help Tellabs install R/3, SAP's wildly popular client/server system.

OPTIONS FOR STRUCTURING SAP CONTRACTS

1. **Value-based contracts**. These contracts tie the consultants' fees to specific objectives. It may be difficult to pinpoint goals in such multifaceted projects, but these deals give the integrators an incentive to work hard.
2. **Sliding scale fees.** Be willing to include "green" R/3 consultants on the team, but pay precious little for them until they come up to speed.
3. **Pay as you go.** Agree to a certain rate for the project's first phase, when the need for R/3 expertise will be highest. Then cut the rates as you build your own internal R/3 skills.

Source: Industry analysts and R/3 customers

SAP-CERTIFIED INTEGRATORS

Andersen Consulting
Cap Gemini America, Inc.
Coopers & Lybrand
Computer Sciences Corp.
Ernst & Young
IBM Corp.
Deloitte & Touche
KPMG Peat Marwick
Price Waterhouse

Companies on the list of 25 top integrators that SAP has certified in R/3 applications, including all areas of financial, logistics and human resources.

Source: SAP America, Inc.

Like hundreds of IS executives, Young is caught up in the SAP frenzy — a market in which 5,000 new R/3 consultants hit the streets in 1995 alone. The grand total to date: 4,500 SAP R/3 user sites and more than 15,000 consultants worldwide. SAP AG estimates that an average R/3 contract costs about $1 million. With consulting fees, the price tag could rise to $5 million.

The SAP integrator market is expected to generate $5 billion in revenue in 1996, up from about $2 billion in 1995, according to the Gartner Group, a research and consulting firm in Stamford, Conn.

DEMAND EXCEEDS SUPPLY

The SAP hullabaloo has created a dilemma for many companies. Because of R/3's tremendous popularity, the supply of qualified consultants has yet to match the demand.

"With R/3, there's a degree of risk because the [consulting] companies out there haven't been working on it very long," warns Barry Day, global SAP leveraged services manager at Du Pont Co. in Wilmington, Del., a major SAP account that will be ramping up R/3 use this year.

Andy Hefer, information systems director at Hydro Agri North America, Inc., Tampa, Fla., knows what Day is talking about. He had some initial trouble finding qualified SAP programmers. "Through trial and tribulation, we figured out who knew what they were talking about," he says.

Hefer recalls one programmer who professed to be well versed in Abap, the SAP programming language. But when the IS staff booted up some of his software, they could barely get it to run. The company invested close to $40,000 for the botched work, Hefer says.

Hydro Agri now works with KPMG Setac, a division of KPMG Peat Marwick that specializes in SAP consulting, and some carefully chosen independent local contractors. Bottom line for Hefer: "You need to find people you can really trust, and you can't be afraid to throw people out."

CLEANING UP ITS ACT

SAP is working to improve the overall quality of the services provided by systems integrators. The company has several efforts under way, including an authorized partner program, to help customers find the right integrators. (See "SAP-Certified Integrators," this page.) "We want to get rid of people going around saying they are R/3 experts when they are not," says Manfred Heisen, director of corporate alliance management for SAP.

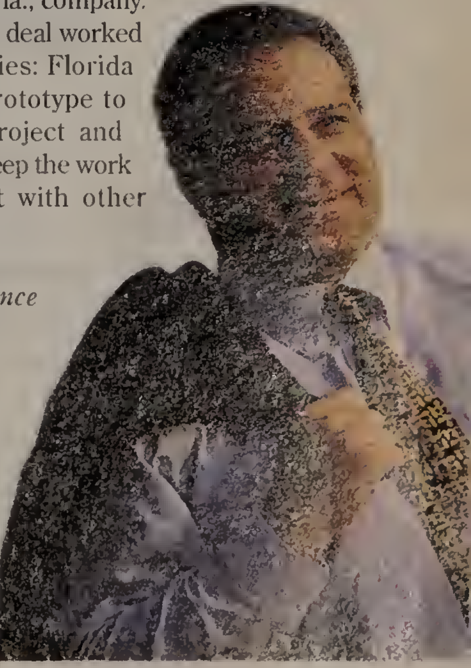
Tellabs' Young, who eventually signed a deal with Deloitte & Touche's Consulting Group/ICS in Chadds Ford, Pa., says meeting the team members ahead of time was important. "ICS flew people in from San Francisco and Seattle," Young says.

SAP veterans also say that companies need to consider new approaches to get the R/3 job done.

Florida Crystals, Inc., a distributor of sugar products, signed a contract in 1994 with Andersen Consulting in part because Andersen agreed to split the cost of designing an R/3 template, says Rodney Rogers, vice president of operations at the Palm Beach, Fla., company.

Rogers says the deal worked out for both parties: Florida Crystals got a prototype to launch a pilot project and Andersen got to keep the work it did and use it with other clients. •

Cafasso is a freelance writer in Walpole, Mass.



"You need to find people you can really trust, and you can't be afraid to throw people out."

Andy Hefer, Hydro Agri North America, Inc.

Photo by Chris Coxwell

Selling the 'net

EVERYONE IS LOOKING TO MAKE MONEY WITH ELECTRONIC COMMERCE. INTEGRATORS MAY BE AMONG THE FIRST TO CAPITALIZE.

By Linda Wilson

Sensing explosive growth, systems integrators are scrambling to develop Internet-specific business practices. The services range from simply reselling hardware and software to architecture design and business-process consulting.

The types of business that integrators are scoping out range from simple Web-server installations and home-page designs to complex electronic commerce strategies and applications. But, because the Internet, particularly the World Wide Web, is still nascent, most integrators don't have a lot of clients yet.

"There is more hype than anything else," says Bonnie Digruis, a vice president at the Gartner Group, Inc., a research firm in Stamford, Conn.

Most would-be clients are just beginning to think about the commercial potential of the Internet, and they are beginning slowly.

SOUP TO NUTS

While most integrators are evolving their Internet business, approaches vary widely. Large consulting firms tend to offer a soup-to-nuts approach, providing everything from consulting on business objectives and strategy to the design and implementation of a specific information systems application.

Other niche players offer a much more narrow scope of services, focusing on integrating technology platforms or creating home pages.

KPMG Peat Marwick in New York is a soup-to-nuts integrator. "We focus on business solutions first and then provide technology solutions," says Robin Palmer, partner and national service line leader for the electronic commerce group.

Consistent with its focus as a management consulting organization, KPMG takes a broad look at a customer's business objectives and then looks at how the Internet can support those objectives. "If all you want is someone to create a home page, we are not the guys," Palmer says.

At the other end of the continuum from KPMG is AmeriData Technologies, Inc. AmeriData launched its Internet service, which focuses on home-page design and server installation, in August 1995.

Lake Superior College in Duluth, Minn., turned to AmeriData for a quick and cheap solution for getting on the Web.

"I wanted a turnkey operation for a Web server. I wanted someone with experience who could show me what the procedure is for setting up a Web page," explains Dan Pioro, campus technical coordinator at Lake Superior College, a 1,000-student school.

AmeriData installed a Compaq Computer Corp. server, Web software from Netscape Communications Corp. and Microsoft Corp.'s Windows NT operating system software. From its office in Minneapolis, AmeriData also set up the software remotely and provided instruction on using the system and developing Web pages. The package cost $7,000, which included a 25% discount for state of Minnesota customers, to which the college was entitled as part of a blanket contract between the state and AmeriData.

USConnect, Inc. in Stamford, Conn., offers services somewhere between AmeriData and KPMG Peat Marwick. The company, which is a consortium of 26 independent network integrators, focuses on the design and implementation of technical solutions, ranging from servers and firewalls

Illustration by Steve Munday

to specific applications. It steers clear, however, of the larger business-strategy issues. Because each of its member firms is independent, services may vary slightly from region to region, although the consortium is now working to develop a standard methodology.

The big-dollar market for integrators, obviously, is in elaborate and expensive services, such as setting up new Web-based businesses or developing on-line services for existing businesses. And integrators are as eager to provide these services as customers are to purchase them.

For example, Digital Equipment Corp. has been working with a bank, which it declined to identify, to develop an application that will allow consumers to apply for a checking account via the Web. The bank is interested in the Web because it believes it is an ideal way to reach young consumers, an important source of new customers.

Deciding which integrator to choose depends, in large measure, on the scope of the project. If you have elaborate plans or want to delve into business process and strategy issues, choose a large player, such as one of the Big Six, Digital or IBM. If your plans are small in scope, a niche player may suit your needs. •

Wilson is a freelance writer in Glen Ellyn, Ill.

MCI's ONE-STOP SHOP

MCI Communications Corp. wants to be your one-stop information technology supplier.

That, in a nutshell, explains why the telecommunications giant late last year paid $1 billion for Toronto-based SHL Systemhouse, Inc.

MCI plans to package SHL's expertise, third-party client/server applications such as Oracle Corp.'s financial systems, and its own voice and data services to furnish users with what it calls enterprise management services.

"We'll bundle network activity, applications licensing, help-desk support and infrastructure to provide users with whatever applications they want on a per-workstation basis," says Greg Jacobsen, SHL's executive vice president of strategy and markets and a member of MCI's executive management team.

On the applications side, MCI's partners so far include Oracle, PeopleSoft, Inc. and Microsoft Corp., according to Jacobsen.

MCI, based in Washington, D.C., will position itself as an "information utility," Jacobsen says. Its outsourcing services will go beyond those offered today and include everything from providing users with a data dial tone and building and maintaining companies' Internet home pages to assuming "total responsibility" for a company's business applications and the business processes they support.

Last year, SHL signed a five-year, multimillion dollar outsourcing agreement with Tupperware Corp. in Orlando, Fla. So far, its activities have included developing the company's Internet and on-line services strategy, including the creation of Tupperware's home page on the World Wide Web.

On the network side, Jacobsen also foresees MCI and SHL creating "virtual electronic commerce" networks. These networks would link trading partners, all of whom could complete their individual business processes within a network-based business application.

Still unanswered, however, is the question of just how ready businesses are to turn over such a wide variety of mission-critical functions to an outside firm.

—Julia King

PLANETARY PROJECTS

Going global

By Arielle Emmett

Vaughn Hovey knows what's involved in a global integration project. A few years ago, the manager of IT supplier and alliance management at Eastman Kodak Co. was involved in an integration project to consolidate 17 data centers in the U.S., Canada, Germany, France, Japan, England, Brazil and Mexico down to seven.

SUCCESSFUL GLOBAL INTEGRATION DEPENDS ON GOODWILL, A SENSE OF MISSION AND AN APPRECIATION OF CULTURAL DIFFERENCES.

Kodak chose IBM for the three-year job in 1990 because of its global reach. IBM's Integrated Systems Solution Corp. (ISSC) based in Somers, N.Y., coordinated its work with IBM units in Europe and Japan. "We were looking for one global supplier who could be flexible in working relationships and provide common processes around change and problem management," Hovey says.

"The data center operations included multiprotocol network connections, a Pan-Asian, Pan-European network and physical backbone management," says Gordon Myers, ISSC's general manager of consulting services and managed operations. "In addition," he notes, "we did logical network management in Europe, RS/6000 server implementations in Latin America and LAN-based electronic-mail management in North America."

"Migration went virtually without a hitch," Hovey recalls.

The cost? Upwards of "hundreds of millions," Myers says. "Kodak was the first large company to engage in a contract of this type."

WHAT IT TAKES

With Latin America in the throes of massive privatization, China building new IT infrastructure and American and European companies scrambling to gain better control of worldwide subsidiaries, integrators say the push for global integration is proceeding rapidly toward a tighter, if not more recentralized, vision of IS.

Globally, the systems integration market is growing at an annual rate of 14%, according to Input, a research firm based in Mountain View, Calif. Top integrators report that many global integration projects are now in the eight-figure range.

"In the past, most manufacturers and business partners worked within a confined area; they focused within a state or country," notes Bill McCracken, general manager of marketing for IBM PC Co. "Now customers need to expand their scope; they need global networks to service their own businesses, and they have to respond," McCracken says.

Some companies, such as Cisco Systems, Inc., already have worldwide private or value-added networks in place but require major upgrades to new databases and functional business applications, especially in client/server.

Cisco Systems' eight-month worldwide rollout of Oracle databases and applications — a complete revamp of its business computing — cost $10 million and involved more than 1,200 users, 10 primary sites in the U.S., Canada and Japan, and more than 100 corporate sales offices, says Peter Solvik, chief information officer for the $3 billion internetworking company headquartered in San Jose, Calif.

The company chose KPMG Peat Marwick as the primary integrator for the project. Oracle Services in Redwood Shores, Calif., a professional services division of Oracle Corp., was selected as a technical subcontractor to provide performance tuning and development standards. The project involved installing and customizing all the Oracle applications — from order entry to manufacturing to financials, about 14 modules in all — and making them accessible from Cisco's San Jose computing

Continued on page SI/16

Illustration by Lilla Rogers/SIS

Going global

Continued from page SI/15

facility to global users across the company's worldwide private network.

A team of 100 professionals from KPMG, Oracle Services, Cisco and outside consulting firms coordinated the project, handling project management, applications development, business function analysis and technical support. For both Canada and Japan, the design work was done in San Jose.

A project such as this requires more than a passing interest from the top. "[Cisco's senior] management backed the project with dollars and freed up senior people in the organization to make it happen," says Mark Lee, KPMG's senior manager of strategic services consulting.

"They had a sense of urgency," Lee says. "[It's my impression that] when clients don't have a sense of urgency, and they don't have enough full-time people on the [integration] job, projects tend to fail."

"To my knowledge, there's never been a core system legacy replacement done for an entire corporation in eight months," says Cisco's Solvik. "It's very successful; we're on time, within budget and meeting the core objectives."

WHEN KODAK NEEDED AN INTEGRATOR TO CONSOLIDATE DATA CENTERS AROUND THE WORLD, IT TURNED TO IBM. "MIGRATION WENT VIRTUALLY WITHOUT A HITCH," SAYS KODAK'S VAUGHN HOVEY.

BALANCING ACT

In many cases, clients do not understand what is required to handle the corporate politics of a global rollout, many integrators say. At the same time, integrators tread a fine line when they impose a standard that corporate headquarters has approved in a country's branch office that prides itself on its autonomy.

"There is a difference between true multinational companies and global companies," observes Frank Callan, a vice president of global business development with Electronic Data Systems Corp. based in Plano, Texas. "Typically, global companies' reporting lines are different; their products drive their individual geographies. By contrast, multinationals have geographies that are more autonomous and choose which products move into various markets.

"As multinationals struggle to move toward the global mind-set, [local geographies] feel left out of the mainstream," Callan observes. "Integrators can get caught up in political battles, and you start to see a pushback — a reluctance of the local geographies to adopt what headquarters has dictated."

Both large and medium-size clients should be looking for global integrators that understand and can handle these subtleties — and can attack a worldwide challenge with a common set of methodologies and practices, Callan says.

But respecting differences is trickier than it may seem. Countries like Japan don't accept imported business practices. "The way you do invoicing and handle the tax system is unique in Japan," says George Kadifa, group vice president for manufacturing practices, Oracle Services. The dilemma is "how to ensure that you design business processes that are global in nature, but still take care of local requirements, [such as] different geographic requirements," he says.

"There is the major issue of international coordination," Kadifa says. "You've got to avoid duplication and inefficiencies. But how do you ensure that local requirements are met while you're not creating an independent solution as you go?

"It requires complex methodology and structure to manage global rollouts," Kadifa says.

The methodology involves the implementation of the integrator's plans at the systems and technical level, the network architecture level, the data repository level, and finally at the people level of operations and training.

DIFFERENT APPROACHES

Global integrators and clients have varying solutions. A company such as Omaha, Neb.-based Inacom Corp., which is a shareholder in the Paris-based joint venture International Computer Group, says that global projects work best when large local integrators manage each location.

"Typically, we're working with the largest systems integrator in each country with the most depth," says Chris Freiwald, president of Inacom's international division.

Cap Gemini Sogeti, a French company with operating units in the U.S. and Europe, has a different idea. "Our approach to staffing an international job is to have our local operating units form a global team," says Mike Meyer, executive vice president of Cap Gemini America, Inc.

"About three years ago, we made a $40 million investment to become more transnational, to adopt a common language, English, for all our documentation and business correspondence, and to adopt common service offerings no matter which country [we] go into," Meyer says.

Large companies want global staffing muscle and centralized control, he argues. "It makes us more sensitive to the marketplace. More and more companies are putting one global project manager in charge; they want to work with a global firm on a worldwide basis — what's implied by that is the strong desire to have us look and feel and act as one company." Gemini accomplishes this by using a common methodology and quality management system across all its operating units.

Perhaps most important to the success of a project is being sensitive to cultural differences. "Americans typically make assumptions about [the way other countries operate], especially if it's an American company abroad," says Brad Callahan, a partner at Ernst & Young in Minneapolis.

Callahan cites a case of a U.S. manufacturer that built a distribution and consignment inventory system in Europe based on a California-flavored model. "The company lost about 12 months of progress [because it] assumed that what was true for California was true for the Europeans.

"That's the kiss of death — not to take time to involve each of the countries affected and to get the full buy-in of the client and its local hubs," he insists. •

Emmett is a freelance writer in Wallingford, Pa.

Top Five Global Integrators

(Ranked by % of total integration revenue derived outside North America)

1.	**Unisys Corp.**	**68%**
2.	**Price Waterhouse**	**65%**
3.	**Control Data Systems, Inc.**	**60%**
4.	**Digital Equipment Corp.**	**55%**
5.	**KPMG Peat Marwick**	**55%**

Source: ParaTechnology, Inc.

Photo by Bob Mahoney

LISTENING TO THE CUSTOMER

When making any major purchase — a car, a house or the services of a systems integrator — it's always helpful to talk to people who have been through the same experience. The more information you have, the better decision you will make. That's why *Computerworld* asked more than 1,000 information systems managers for input on how well their integrators delivered the goods.

The goods, in this case, are 22 specific criteria, ranging from technical competence to personal relations. We gathered the criteria into three categories: business practices, (displayed in green), project management (orange) and technical performance (purple). These three categories were then combined to create a single ranking called overall satisfaction (shown in red). Aggregated customer satisfaction ratings are on this page, and details for the categories are on page SI/18.

METHODOLOGY

The 25 companies in this special report were selected from a list of the largest 100 systems integrators. The list of 100 was compiled by ParaTechnology, Inc., a Bellevue, Wash.-based market research and consulting firm that focuses on customer and vendor IT strategies. ParaTechnology was *Computerworld's* partner in this project.

To qualify for the list of 100, integrators had to be based in North America — but not necessarily owned by a North American parent — and derive more than 50% of their total integration revenue from commercial, not government, contracts.

The selection of the 25 companies was based on ParaTechnology's estimate of the service component of the company's North American systems integration revenue for the most

Continued on page SI/18

INDUSTRY BREAKDOWN

MANUFACTURING	20%
BANKING/FINANCE	12%
HEALTH CARE	11%
RETAIL	5%
INSURANCE	5%
TELECOMMUNICATIONS	5%
TRANSPORTATION	3%
PUBLISHING	2%
AUTOMOTIVE	2%
LEGAL	2%
WHOLESALE	2%
REAL ESTATE	1%
OTHER	30%

Satisfaction Rankings of Systems Integrators

	OVERALL SATISFACTION	= BUSINESS PRACTICES	+ PROJECT MANAGEMENT	+ TECHNICAL PERFORMANCE
1	AmeriData Technologies, Inc.	Control Data Systems, Inc.	AmeriData Technologies, Inc.	AmeriData Technologies, Inc.
2	Unisys Corp.	MicroAge, Inc.	Unisys Corp.	Unisys Corp.
3	Hewlett-Packard Co.	Unisys Corp.	Hewlett-Packard Co.	USConnect, Inc.
4	Control Data Systems, Inc.	AmeriData Technologies, Inc.	Control Data Systems, Inc.	Hewlett-Packard Co.
5	USConnect, Inc.	Price Waterhouse	Price Waterhouse	The Future Now, Inc.
6	Price Waterhouse	Hewlett-Packard Co.	USConnect, Inc.	MicroAge, Inc.
7	Digital Equipment Corp.	Digital Equipment Corp.	Deloitte & Touche	Digital Equipment Corp.
8	Deloitte & Touche	Deloitte & Touche	Digital Equipment Corp.	Entex Information Services
9	The Future Now, Inc.	KPMG Peat Marwick	MicroAge, Inc.	IBM Corp.
10	MicroAge, Inc.	Entex Information Services	Entex Information Services	AT&T Corp.
11	Entex Information Services	AMS*	The Future Now, Inc.	Price Waterhouse
12	AT&T Corp.	Cap Gemini America, Inc.	Shared Medical Systems Corp.	Control Data Systems, Inc.
13	Cap Gemini America, Inc.	AT&T Corp.	Cap Gemini America, Inc.	Deloitte & Touche
14	IBM Corp.	The Future Now, Inc.	Coopers & Lybrand	Inacom Corp.
15	Shared Medical Systems Corp.	USConnect, Inc.	AT&T Corp.	Shared Medical Systems Corp.
16	Vanstar Corp.	IBM Corp.	Vanstar Corp.	Cap Gemini America, Inc.
17	Inacom Corp.	Ernst & Young	IBM Corp.	Vanstar Corp.
18	Coopers & Lybrand	Shared Medical Systems Corp.	Electronic Data Systems Corp.	Ernst & Young
19	Ernst & Young	Coopers & Lybrand	Inacom Corp.	Electronic Data Systems Corp.
20	AMS*	Inacom Corp.	Ernst & Young	AMS*
21	KPMG Peat Marwick	Vanstar Corp.	AMS*	KPMG Peat Marwick
22	Electronic Data Systems Corp.	Andersen Consulting	SHL Systemhouse, Inc.	Coopers & Lybrand
23	SHL Systemhouse, Inc.	Computer Sciences Corp.	KPMG Peat Marwick	SHL Systemhouse, Inc.
24	Andersen Consulting	Electronic Data Systems Corp.	Andersen Consulting	Computer Sciences Corp.
25	Computer Sciences Corp.	SHL Systemhouse, Inc.	Computer Sciences Corp.	Andersen Consulting

Source: *Computerworld* and ParaTechnology, Inc.
*American Management Systems, Inc.

continued from page SI/17

recent complete fiscal year. Services exclude hardware and software resold by the integrator, as well as canned software developed by the integrator for sale.

In addition to revenue, *Computerworld* required that the 25 integrators have a significant presence in the marketplace. Presence was determined by a telephone survey of more than 15,000 randomly selected information systems managers, including *Computerworld* subscribers. Conducted in July and August 1995, the survey asked IS managers to name the systems integrators they have used in the past three years. The vast majority of the 15,000 names used in this survey came from independent sources not affiliated with systems integrators.

Once the list of 25 integrators was established, ParaTechnology surveyed 1,024 of their customers. High-level technology managers with specific knowledge of the integration projects were interviewed, including chief information officers, directors of technology and IS managers. At least 35 customer surveys were completed for each integrator. For most, 50 surveys were completed. The 1,024 people surveyed were drawn from the aforementioned list of 15,000 IS managers.

Customers were asked to rate their satisfaction with their systems integrators in 22 critical areas, including project completion (on time and on budget), system compatibility and ease of use, and knowledge transfer. The systems integrators were ranked on the mean of their ratings for each category. (The top 10 integrators for all 22 areas are listed on this page.)

Satisfaction was ranked from 1 to 5, with 5 being "very satisfied" and 1 being "very dissatisfied." Mean scores for all systems integrators in all categories averaged above 3 (neutral), and the majority scored below 4 (satisfied).•

For more information on the methodology, contact Bob Fink, *Computerworld* research director, or Peter Raulerson, president and CEO, ParaTechnology, Inc. Fink can be reached on the Internet at bob_fink@cw.com or by telephone at (508) 820-8116. Raulerson can be reached via the Internet at 71441.121@compuserve.com or by telephone at (800) 377-2021.

COMPANY SIZE BY REVENUE

MORE THAN $10B	13%
$1B TO $10B	26%
$500M TO $1B	10%
$100M TO $500M	16%
LESS THAN $100M	25%
NO RESPONSE	10%

NUMBER OF COMPANY EMPLOYEES AFFECTED BY THE INTEGRATION PROJECT

LESS THAN 25	9%
25 TO 49	7%
50 TO 100	11%
100 TO 249	17%
250 TO 499	10%
500 TO 1,000	14%
1,000 TO 2,499	15%
2,500 TO 4,999	7%
5,000 TO 50,000	10%
MORE THAN 50,000	1%

PROJECT MANAGEMENT CRITERIA BREAKOUTS

	Training provided by integrator to users	Integrator's ongoing service/support	Integrator's quality assurance
1	Deloitte	HP	Future Now
2	AmeriData	AmeriData	Unisys
3	Price Waterhouse	Control Data	AmeriData
4	Control Data	Vanstar	HP
5	HP	Price Waterhouse	IBM
6	Unisys	Entex	Control Data
7	Future Now	Digital	Digital
8	USConnect	IBM	Price Waterhouse
9	Entex	Unisys	Cap Gemini
10	Shared Medical	MicroAge	Deloitte

	Integrator's knowledge of your business	Integrator's systems integration experience	Integrator's level of flexibility
1	Deloitte	USConnect	AmeriData
2	Ernst & Young	Unisys	Control Data
3	Shared Medical	HP	MicroAge
4	Unisys	Cap Gemini	Price Waterhouse
5	AMS	MicroAge	Entex
6	Price Waterhouse	IBM	HP
7	AmeriData	Digital	Future Now
8	KPMG	Shared Medical	Cap Gemini
9	Coopers	Future Now	Digital
10	HP	AmeriData	Deloitte

	Integrator's project management skills	Project's final price vs. bid price	Project's final price relative to performance
1	Coopers	AmeriData	USConnect
2	Deloitte	MicroAge	Unisys
3	Price Waterhouse	Unisys	AmeriData
4	Andersen	USConnect	Control Data
5	Ernst & Young	Entex	Future Now
6	IBM	Digital	MicroAge
7	HP	Inacom	Inacom
8	Unisys	Coopers	HP
9	Control Data	HP	Vanstar
10	SHL	Vanstar	Entex

BUSINESS PRACTICES CRITERIA BREAKOUTS

	Ease of doing business with integrator	Personal relationship with integrator	Integrator's problem resolution process
1	AmeriData	Unisys	AMS
2	MicroAge	AmeriData	AmeriData
3	Entex	Control Data	Control Data
4	Price Waterhouse	Price Waterhouse	KPMG
5	Control Data	Entex	Price Waterhouse
6	Deloitte	Digital	Deloitte
7	HP	Future Now	IBM
8	Unisys	Shared Medical	HP
9	Digital	MicroAge	Unisys
10	Cap Gemini	AT&T	Future Now

	Integrator's communication process	Transfer of knowledge to your organization	Integrator's innovativeness
1	Price Waterhouse	Digital	Unisys
2	Control Data	Unisys	HP
3	AmeriData	USConnect	Control Data
4	Deloitte	Control Data	Deloitte
5	Unisys	HP	Price Waterhouse
6	AMS	AmeriData	USConnect
7	KPMG	Entex	AmeriData
8	HP	Shared Medical	Future Now
9	Coopers	MicroAge	AT&T
10	Cap Gemini	Cap Gemini	Digital

TECHNICAL PERFORMANCE CRITERIA BREAKOUTS

	Project's technical features	Project's business benefits	Actual vs. scheduled completion time	Compatibility with other systems	System's ease of use	Overall quality of integrator's project	Integrator's technical expertise
1	HP	HP	AmeriData	USConnect	AmeriData	AmeriData	IBM
2	Unisys	Unisys	Price Waterhouse	AmeriData	USConnect	HP	HP
3	AmeriData	USConnect	Unisys	Entex	Future Now	Unisys	Unisys
4	USConnect	AMS	Coopers	Unisys	HP	Price Waterhouse	Control Data
5	Future Now	AT&T	Inacom	Cap Gemini	Inacom	AT&T	Future Now
6	IBM	Deloitte	USConnect	Future Now	Unisys	Entex	USConnect
7	MicroAge	Future Now	Digital	MicroAge	Entex	Future Now	Digital
8	AT&T	MicroAge	Entex	Vanstar	Digital	Digital	Deloitte
9	Electronic Data	Ernst & Young	HP	IBM	MicroAge	USConnect	AT&T
10	KPMG	KPMG	Future Now	HP	Deloitte	MicroAge	Cap Gemini

Source: *Computerworld* and ParaTechnology, Inc.

Computerworld's Top 25 Integrators by Revenue

Ranked by North American integration services revenue	Company	Headquarters	Type of integrator (top-down, bottom-up or both)[1]	North American integration revenue (services only unless noted)	North American integration revenue as % of total revenue (services only unless noted)	Commercial integration revenue as % of total integration revenue	International integration revenue as % of total integration revenue	Number of integration offices worldwide	Total integration employees worldwide	Vertical markets served[2]	World Wide Web sites
1	Electronic Data Systems Corp.	Plano, Texas	BT	$7,370,000,000 [3]	73%[3]	85%	25%	450	NA	C,E,G,I,J,K,L,M,P,R,S,U,V,W,X	http://www.eds.com
2	IBM Corp.	White Plains, N.Y.	BT	$6,000,000,000	9%	92%	38%	390	15,000	C,D,E,G,J,K,L,M,N,P,R,T,U,W,X	http://www.ibm.com
3	Computer Sciences Corp.	El Segundo, Calif.	T	$2,272,000,000	88%	52%	12%	575	NA	C,J,K,L,M,P,R,T,W,X	http://www.csc.com
4	Andersen Consulting	Chicago, Ill.	T	$1,678,000,000 [3]	49%[3]	90%	46%	152	32,711	C,F,I,K,L,M,P,T,W,X	http://www.ac.com
5	AT&T Corp.	Dayton, Ohio	BT	$1,050,000,000	1%	70%	25%	1,100	47,000	C,F,K,M,T,U,X	http://www.att.com
6	Digital Equipment Corp.	Maynard, Mass.	BT	$1,000,000,000	7%	80%	55%	800	31,000	C,D,E,G,J,K,L,M,P,R,T,U,W,X	http://www.digital.com
7	Hewlett-Packard Co.	Mountain View, Calif.	BT	$903,000,000	4%	85%	50%	600	5,000	C,E,G,J,K,L,M,P,R,T,W,X	http://www.hp.com
8	Shared Medical Systems Corp.	Malvern, Pa.	T	$434,700,000	79%	100%	12%	36	4,000	L	NA
9	Ernst & Young	New York, N.Y.	T	$410,000,000	26%	100%	40%	600	6,300	A,C,D,E,F,I,J,L,M,P,Q,R,T,U,W,X	http://www.ey.com
10	American Management Systems, Inc.	Fairfax, Va.	T	$374,094,000	81%	57%	18%	41	4,195	C,G,I,K,L,M,R,T,W	http://www.amsinc.com
11	Price Waterhouse	Bethesda, Md.	T	$357,000,000	9%	80%	65%	150	15,000	C,E,H,J,K,M,N,P,R,T,W,X	http://www.pw.com
12	Unisys Corp.	Blue Bell, Pa.	BT	$302,400,000	5%	78%	68%	155	NA	A,C,K,L,M,U	http://www.unisys.com
13	SHL Systemhouse, Inc.[5]	Toronto, Ontario	T	$264,000,000	23%	70%	15%	90	4,500	C,D,E,G,I,K,L,M,N,O,P,R,T,W,X	http://www.shl.com
14	KPMG Peat Marwick	Montvale, N.J.	T	$249,300,000	4%	65%	55%	1,100	NA	A,B,C,D,E,G,J,K,L,M,N,P,R,T,U,W,X	http://www.kpmg.com
15	Deloitte & Touche	Wilton, Conn.	T	$233,000,000	4%	60%	40%	130	3,100	C,E,K,L,M,P,R,T,X	http://www.dttus.com
16	Cap Gemini America, Inc.	New York, N.Y.	T	$197,000,000 [3]	100%[3]	NA	NA	35	2,500	A,C,E,F,K,P,R,T,W,X	NA
17	Vanstar Corp.	Pleasanton, Calif.	B	$193,641,089	15%	90%	0%	95	1,641	Fortune 2000 companies	http://www.vanstar.com
18	Inacom Corp.	Omaha, Neb.	B	$179,550,000	10%	94%	0%	1,400[7]	850	All	http://www.inacom.com
19	Entex Information Services	Rye Brook, N.Y.	B	$162,500,000	13%	85%	0%	300	1,900	C,E,K,L,M,N,R,T,W	http://www.entex.com
20	Coopers & Lybrand	New York, N.Y.	T	$148,000,000	8%	99%	49%	100	2,400	B,C,D,G,I,K,L,M,P,R,T,W,X	http://www.colybrand.com
21	MicroAge, Inc.	Tempe, Ariz.	B	$132,969,293 [4]	6%	81%	1%	75	768	Fortune 1000 companies	http://www.mid.com
22	USConnect, Inc.	Stamford, Conn.	B	$80,676,000	37%	95%	17%	50	1,350	C,D,G,K,L,M,N,P,T,X	http://www.usconnect.com
23	Control Data Systems, Inc.	Arden Hills, Minn.	T	$70,697,860	13%	60%	60%	52	2,100	C,K,P,T	http://www.cdc.com
24	AmeriData Technologies, Inc.	Minneapolis, Minn.	B	$69,500,000	7%	80%	0%[6]	70[6]	882[6]	C,D,G,K,L,M,N,P,T,U,W,X	http://www.ameridata.com
25	The Future Now, Inc.	Cincinnati, Ohio	B	$67,000,000 [4]	8%	98%	0%	26	629	D,G,K,P	http://www.tfn-in.com

Twenty-five of the largest systems integrators, based on fiscal 1994 data.
Source: ParaTechnology, Inc.

---

[1] T = Top-down integrators typically focus on consulting and applications; the project is driven from the boardroom.
B = Bottom-up integrators typically focus on implementation; the project is driven by the need for new or upgraded technology.
BT = Integrators with both top-down and bottom-up practices.

[2] **Vertical Markets Key** A. Aeronautics/aerospace
B. Automotive C. Banking/financial D. Business service
E. Chemical F. Consumer products G. Education
H. Electronics I. Energy J. Entertainment
K. Government L. Health care M. Insurance N. Legal
O. Logistics P. Manufacturing Q. Media
R. Pharmaceutical S. Publishing
T. Telecommunications U. Transportation V. Travel
W. Utilities X. Wholesale/retail

[3] Estimate does not factor out hardware and software components of integration revenue.

[4] Estimate by company.

[5] Acquired by MCI Communications Corp. in September 1995.

[6] Figure does not include AmeriData Technologies' 1995 purchase of $34 million worth of international product integration and maintenance operations from Control Data Systems, which resulted in 1,000 CDS employees transferring to AmeriData.

[7] Offices include Inacom franchises.

NA = Not available.

The Newspaper of Information Systems Management
COMPUTERWORLD
Everything you need to know.
trade.

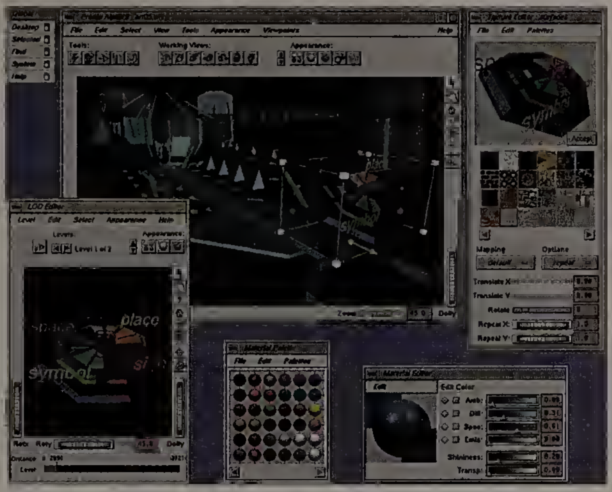
Banyan leads way to safe E-mail address listings, **66**

Vendors push 3-D on 'net

By Mitch Wagner

In two years, will the millions of World Wide Web surfers be swooping and flying through a three-dimensional space like something out of *Johnny Mnemonic* or *The Lawnmower Man*?

Some 56 vendors, including Silicon Graphics, Inc. and Netscape Communications Corp., think so. Last week, they banded together to support a technical standard, called Moving Worlds, for building 3-D pages on the Internet.



All Web pages *may have spiffy 3-D graphics in the future*

Virtual reality

Moving Worlds has been proposed as an extension to the Virtual Reality Modeling Language (VRML).

It was submitted earlier this month to the VRML Architecture Group, a multivendor body that sets industry standards for VRML. Other competing submissions include proposals by Microsoft Corp., Apple Computer, Inc., Sun Microsystems, Inc., IBM and the German Dynamic Research Center for Information Technology in Sankt Augustin, Germany.

VRML 1.0 has been out for about a year, and several dozen Web sites have incorporated it. There are also about a dozen browsers available for viewing VRML, some of which function as plug-ins for Netscape or Microsoft Explorer.

The current VRML is rather slow, clunky and cartoonish — even on a high-powered PC — and objects within a VRML universe can't move.

Nonetheless, it works, and you can pilot your browser through a VRML house or a model of part of San Francisco. You can also examine some items of furniture or a car.

"The focus of the VRML experience today is what we call the 'haunted house' effect, where you move through a huge space and see these objects and stop to examine each one of them. Maybe they do something interesting, but basically they're static," said Mike Kelley, manager of the dynamic media group at Apple in Cupertino, Calif.

Conversely, the proposals for VRML 2.0, including Moving Worlds, would speed up performance, add multimedia support and allow objects to be programmed to move around, using a language such as Sun's Java. The technology was designed to run well on Pentium-class PCs.

Unlike *Lawnmower Man* and other fictional virtual realities, the technologies now being developed rely on conventional monitors, keyboards and mice, rather than head-mounted displays — or direct mind-to-computer interfaces, for that matter.

VRML, *page 66*

Reality check

Morgan Stanley & Co. is experimenting with VRML as a way to display the results of risk analyses in three dimensions.

Morgan's Market Risks Department uses Discovery software by Visible Decisions, Inc. to model risks of financial investments in varying market conditions. Discovery displays results using a proprietary client. But Harry Mendell, a department vice president, is experimenting with displaying the results in VRML format over an intranet connection to a Sun Microsystems, Inc. SPARCstation running a Sun VRML browser.

By seeing data in three dimensions, it is easier to make intuitive connections than with a 2-D chart or table of numbers. "It allows side-by-side comparison with lots of data," Mendell said. "We've been looking at this data for over a year now, and when we got this running, I saw things I've never seen before."

The advantage of using VRML, if it works, is that Display requires a Silicon Graphics client to run, while VRML can run on any Internet-connected machine.

So far, Mendell said, the results have been disappointing because the VRML client being used is too slow to render images. However, he said he is confident that future browsers, due later this year from Sun, will have better performance. — *Mitch Wagner*

Intranet product race is on

Firms get set to release tools and utilities to develop internal networks

By Kim S. Nash

These days intranets are a lot like presidential candidates: You hear a lot about them, but you aren't quite sure what they can do for you.

Intranets are internal programs that run over protected parts of the public Internet. They aren't flashy, but a well-crafted intranet can save you money, according to Brian Boyd, director of Internet services at United Video Satellite Group, Inc., a cable and satellite company in Tulsa, Okla.

Some savings, for example, can come from shorter development cycles. In traditional LAN applications, programmers must write parts of the program for different clients — Windows, Macintosh, the Open Software Foundation's Motif and so on. But anyone with a browser, regardless of desktop platform, can use an intranet application.

United Video plans to start moving several internal production applications, including database-related programs, to its intranet between now and May, Boyd said.

Boyd said he can't specify exactly how much money he will save compared with using a LAN setup, but he said intranet systems "clearly hold a lot of potential for cost and time savings."

Intranet news

Zona Research in Redwood City, Calif., offers on-line delivery of news and commentary related to intranet products. For pricing and other details, send E-mail to info@xbg.com.

Unlike some politicians, the intranet idea has a lot of vendors behind it, with products designed to make it work. In fact, a bunch of tools and utilities were announced recently. Here's a roundup of some of the more notable ones:

- **Microstrategy, Inc.**, a data warehouse tools vendor in Vienna, Va., started beta-testing Web DSS early this month. The product, which is due to ship March 30, was designed to let users analyze marketing information stored in relational databases via various World Wide Web browsers.

- Grocery firm **Hannaford Brothers Co.** in Scarboro, Maine, plans to build a Web-accessible warehouse with Web DSS and hand "all decision-makers" access to the system, according to a spokesman.

  The Microstrategy product supports browsers from Microsoft Corp., Netscape Communications Corp., Oracle Corp. and Spyglass, Inc. Concurrent user pricing starts at $50,000.

- **Open Text Corp.** last week unveiled Livelink Intranet, a suite of search, document management and collaboration applications priced at $12,500 to $130,000, depending on hardware used.

- This week, **FTP Software, Inc.** in North Andover, Mass., plans to start shipping a secure, Windows NT-based Web server, dubbed Esplanade, targeted at intranet users. The $1,195 product comes with a module to link Web applications with legacy information stored in relational databases that support the Open Database Connectivity (ODBC) protocol.

  A nonsecure edition of Esplanade is $495.

  A Web-enabled groupware application using Esplanade will likely replace Notes for a team of 25 engineers at Quad Tech International, a large printing company in Sussex, Wis.

  "It's just a whole lot faster to communicate with people over the Internet than it is with Notes," said Tom Boser, a software engineer at Quad Tech.

Banyan takes Internet product plunge

Readies Switchboard white page directory that will ensure user privacy

By Tim Ouellette

Some Internet white page listings are trying to be more than just large electronic-mail directories, while providing users with more privacy.

Banyan Systems, Inc.'s Switchboard, currently in beta testing, will include publicly available names and street addresses for up to 93 million people and 17 million businesses. E-mail addresses will be available but only from users who register with the service.

Based on Banyan's StreetTalk directory technology, Switchboard also lets users have as much control as they want over how their information is listed in the directory. A user can list professional contact information while placing a privacy screen over his E-mail address.

And a "knock-knock" feature will notify those who register that someone wants to contact them, sort of like a Caller ID for E-mail. Analysts were impressed with Banyan's focus on the issues facing registered users, as opposed to the more common practice of trying to make the searches easier for other on-line users.

"Other systems don't focus as much on the listee," said Thomas Pincince, senior analyst at Forrester Research, Inc. in Cambridge, Mass. "I think the fear [users] have is that they will be a sort of Internet stalking victim."

Switchboard will also soon be able to store public key certificates thanks to an agreement with VeriSign, Inc. Public key certificates let users decrypt secure E-mail from certain users. With Switchboard as a repository for these certificates, users can initiate secure conversations with people whose certificates they don't already possess.

Switchboard, now available, is free for basic searching and listing, but Banyan plans to include value-added services for a fee.

Another white pages directory, newly available earlier this month, (http://www.four11.com) from Four11 Corp. in Menlo Park, Calif., lists about 51 million E-mail addresses but also gives users the option to change their own listing. Registered users can add fields to their listing and receive better search capabilities.

To protect users' listings, though, only the domain is listed in search results, not the full E-mail address. And to keep marketers from downloading whole pieces of the directory, Four11 tracks how many times a user pulls addresses off the directory.

The list managers will be beeped automatically when thresholds are reached and can then inform the listee and turn off his listing.

In a nutshell

Switchboard offers the following features:

- Users can remove or modify their listings.
- Registered users can shield portions of their listing with a privacy screen.
- A "knock-knock" feature notifies the listee when someone on the Internet wants to get the listee's E-mail address.

— Tim Ouellette

Offers low-cost version of BeyondMail

By Tim Ouellette

Banyan Systems, Inc.'s Internet efforts picked up steam last week at Internet Expo with the announcement of Internet electronic-mail software and a privacy-enhanced directory of E-mail addresses.

Banyan's new Internet division — Coordinate.com — previewed BeyondMail Personal Internet Edition and Switchboard, the E-mail directory, at the San Jose, Calif., conference.

BeyondMail Personal Internet Edition is a $29 consumer offshoot of the $105 Professional version announced for business users in December. The products support Internet standards such as Simple Mail Transfer Protocol (SMTP), Multipurpose Internet Mail Extensions and Post Office Protocol-3 (POP-3) and require POP-3 and SMTP mail servers.

E-mail strategy

Switchboard is like a "white pages" listing of E-mail addresses that is accessible on the World Wide Web. But Switchboard lets users decide to what extent their E-mail addresses will be revealed to visitors at the Web site, http://www.switchboard.com. (see story at left).

For example, users can prepare their own listing and invoke a privacy screen that prevents the E-mail address from being divulged but alerts users when someone wants to contact them.

Switchboard initially will be promoted as a free consumer service to gain recognition, but analysts see the directory as a place for business communications. "People will start to use it as a business tool, especially because it is blazingly fast," said Thomas Pincince, a senior analyst for network strategy at Forrester Research, Inc. in Cambridge, Mass.

The personal and professional Internet mailers add external E-mail capability to Banyan's internal E-mail installations. The Service Employees International Union in Washington uses the Message Handling Service version of BeyondMail internally, but for Internet mail there were no good gateways, said network manager Steve Loudermilk.

He said that initially he was a little skeptical about Banyan's Internet efforts, but Loudermilk said the Internet E-mail package looks exactly like the tried-and-true LAN versions and adds BeyondMail's strengths in filtering rules and electronic forms.

The rules can be used to automatically download a user's favorite Web sites each day so that they can be read off-line. And like some other E-mail packages, BeyondMail lets users add Web hot links to a message so that the recipient can automatically connect to that site.

VRML

CONTINUED FROM PAGE 65

All of which is very fun. But what is the mainstream business application? Proponents argue that, even after the novelty wears off, Internet users will find a 3-D world easier to understand and navigate than the 2-D, hypertext world of the Internet.

The 3-D technology will have applications in engineering, data modeling, finance, advertising, sales and entertainment.

"A walk-through environment that looks like a store is better than flat Web pages," said Percy Young, manager of store systems and webmaster at Burlington Coat Factory Warehouse Corp. in Burlington, N.J.

"A business user in the commercial area is looking for an edge on the competition. If the new technology can provide that edge, that's the reason to look at it."

3-D on-line

Using innovative high-resolution 3-D virtual-reality technology, AT&T's ImagiNation Network plans in the third quarter to roll out a completely new version of its consumer online service.

The on-line service with the working name "CyberPark" will let users represent themselves as multimedia figures with human or cartoon forms, dress them in clothing and navigate through a mock-up of a little village, with storefronts, gaming tables, chat rooms and other attractions.

The service, based in Burlingame, Calif., will get around the bandwidth limitations of dial-up on-line connections by storing a library of graphics on the client machine. The graphics will be stored on a CD-ROM that the user keeps loaded while logged in to the network. The only signals transmitted over telephone lines will control navigation, text and voice signals, and a tiny amount of new multimedia content for each session.

Initially, the service will go after the on-line gaming and entertainment markets, but within a few months after launch, the ImagiNation Network plans to recruit mainstream businesses to post information in its virtual-reality format.

"We are not just in the business of just making 3-D environments for weird, niche markets," said Dean DeBiase, company president and CEO. "We want to be mainstream and appeal to people who now read the *The Wall Street Journal.*"

The change to advanced technology is a big step for ImagiNation, which has fewer than 100,000 consumers — compared with subscriber bases in the millions for America Online, CompuServe and Prodigy. The ImagiNation network now focuses on on-line gaming, from backgammon to sports-simulation to space wars. It runs using a proprietary, DOS-based front end.

— Mitch Wagner

Briefs

MIMEsweeper now shipping

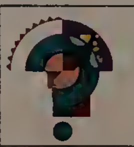
Central House Technologies, Inc. is shipping MIMEsweeper, virus software for Internet mail and Lotus Development Corp.'s CC:Mail. It checks electronic mail and Multipurpose Internet Mail Extension (MIME) attachments for viruses. It costs $2,875 for 100 users.

Safer commerce on the Internet

Netscape Communications Corp. signed a deal late last week to bundle its Commerce and Merchant World Wide Web servers with forthcoming secure transaction software and services from **Verifone, Inc.** Verifone in Redwood City, Calif., plans to target the offerings at banks, credit-card processing companies and other financial firms that process transactions conducted by on-line retailers. Verifone's products are due out in the second and third quarters. Prices will be determined on a case-by-case basis, depending on the type of consulting services users buy, a Verifone spokesman said.

Firm releases Java development environment

TakeFive Software in Cupertino, Calif., last week announced a version of its Sniff+ software development environment for Sun Microsystems, Inc.'s Java Internet programming language. Sniff+ for Java, which is based on TakeFive's C++ development tool set, will ship this quarter; pricing hasn't been set.

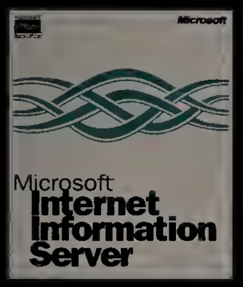


Star Trek

What if the world's most **powerful web server** were also the **easiest**?

What if you could install it in under **5 minutes**?

What if it were **free**?

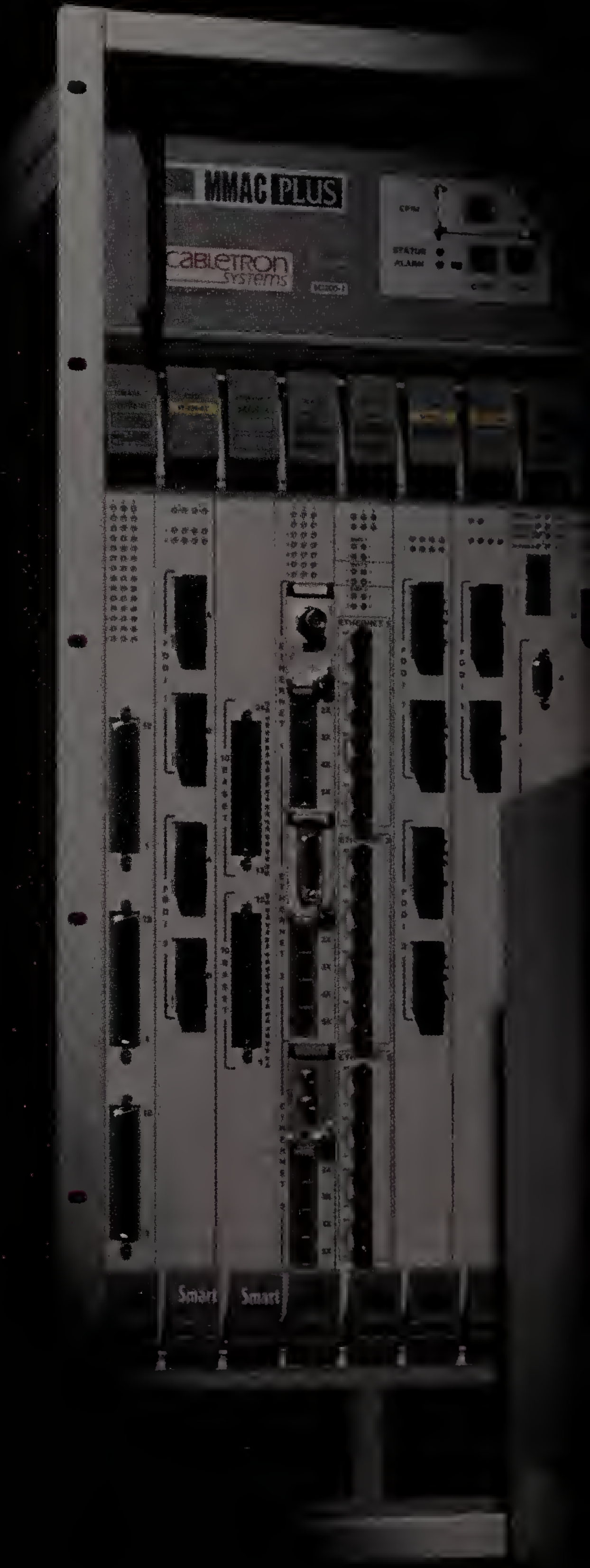


Chances are, you'd run to your computer and download Microsoft® Internet Information Server. It's optimized for the Microsoft Windows NT™ Server operating system,* which speaks for itself. But there's much more to tell. It's 100% faster than all other Windows NT-based web servers,** and executes web applications up to five times faster than all other servers.*** Which certainly makes it your best choice for publishing information on the Internet and internal corporate webs. • Everything you need is built-in, including Web, FTP, and Gopher services, Secure Sockets Layer, and a high-performance open Internet Database Connector. All with the graphical ease you've come to expect from Windows.® • It couldn't be any less expensive. So download it at no charge today by visiting http://www.microsoft.com/infoserv. If you prefer, you can get it at your local reseller for about $99 or with Windows NT Server for $999. Call **(800) 426-9400** for the name of a reseller near you, or for information on an upcoming Internet Information Server Seminar.

download
INTERNET
INFORMATION
SERVER FOR
WINDOWS NT
free

Microsoft
WHERE DO YOU WANT TO GO TODAY?

*To run Internet Information Server, you need Windows NT Server 3.51. Internet connection charges may apply when downloading the software. **According to NSTL benchmarks. ***Based on benchmarks using CGI Script. © 1996 Microsoft Corporation. All rights reserved. Microsoft and Windows are registered trademarks and the BackOffice logo. *Where do you want to go today?* and Windows NT are trademarks of Microsoft Corporation.



Fast

to deliver lightning-quick service on a per-user basis

Reliable

to handle your mission-critical applications

Flexible

to work in new or familiar surroundings

and Smart (of course)

to lead you to the ultimate in virtual networking

SYNTHESIS

CABLETRON SYSTEMS
The Complete Networking Solution™

35 Industrial Way
Rochester, NH 03867
(603) 332-9400
Fax: (603) 337-2211
Internet: http://www.ctron.com/

the Cabletron SmartSwitch™ Family

Let's Talk Speed

A dedicated ASIC-based switching engine forwards packets at a blazing 750,000 packets per second. Add support for 16,000 MAC addresses and you have a switch that significantly outperforms its nearest competitor.

Let's Talk Reliability

With built-in alarm thresholding, redundant links and RMON support, Cabletron's new SmartSwitches lay the foundation for a highly manageable switched infrastructure. If something has to get through, you'll want it traveling on a SmartSwitch.

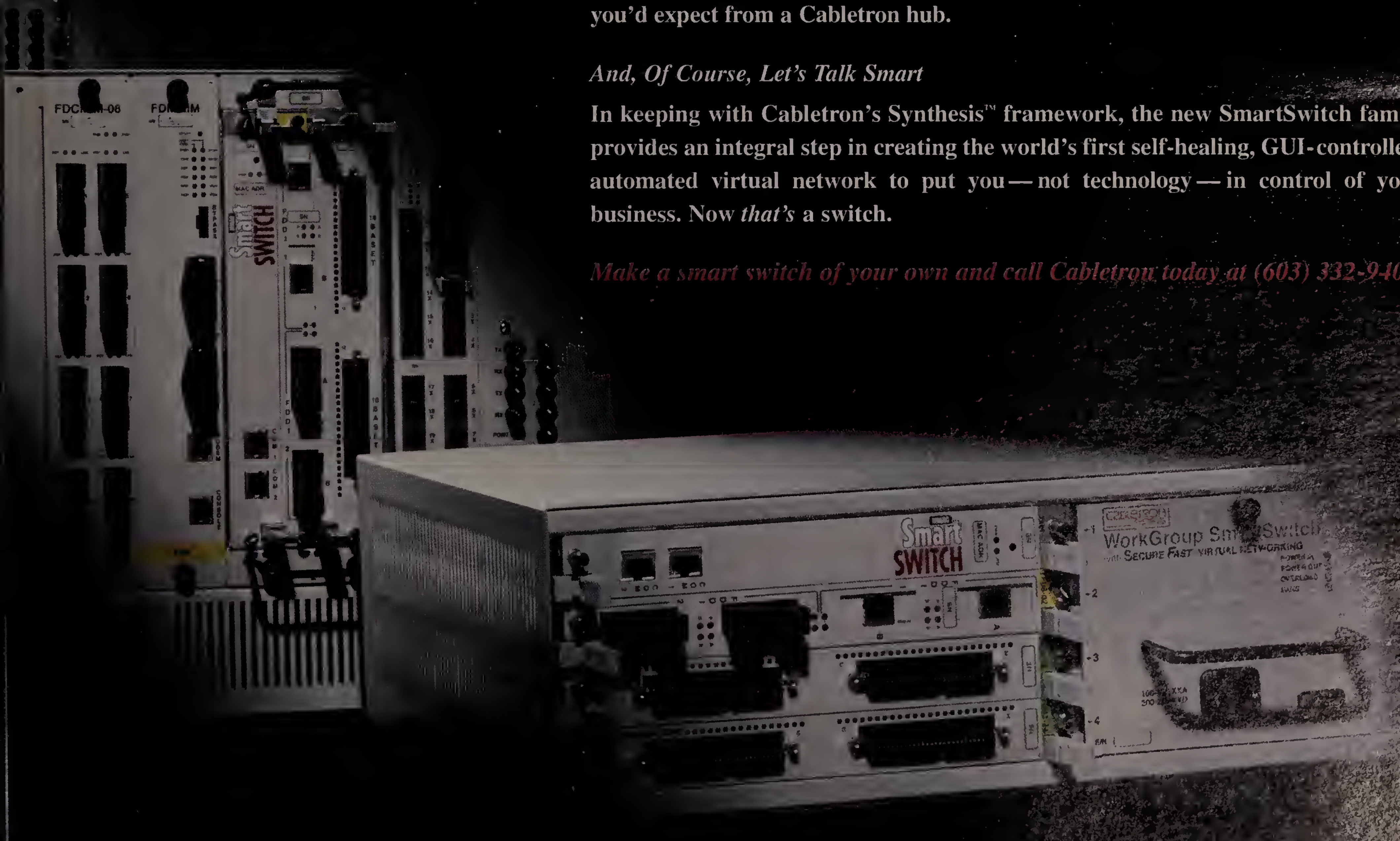
Let's Talk Flexibility

Whether you're starting from scratch or building off an existing network, SmartSwitches are the perfect fit. The MMAC and MMAC-Plus SmartSwitches protect investments as they leverage the security and reliability of a "smart hub." The modular Workgroup SmartSwitch provides up to 48 switched Ethernet ports as well as a high-speed uplink, and includes many of the same fault tolerant features you'd expect from a Cabletron hub.

And, Of Course, Let's Talk Smart

In keeping with Cabletron's Synthesis™ framework, the new SmartSwitch family provides an integral step in creating the world's first self-healing, GUI-controlled, automated virtual network to put you — not technology — in control of your business. Now *that's* a switch.

Make a smart switch of your own and call Cabletron today at (603) 332-9400.



New Products

Digital Equipment Corp. has announced Internet Collaboration Solution Package.

According to the Maynard, Mass., company, Internet Collaboration Solution Package is a customizable hardware, software and services package designed for users interested in workgroup collaboration. It lets users, partners and suppliers share information, notes, files, discussion groups and other collaborative efforts across internal (intranet) and external (Internet) networks.

Internet Collaboration Solution Package can include Digital's AlphaServer system and Workgroup Web Forum software. It can also have use of Digital's tunneling products and software.

Pricing for Internet Collaboration Solution Package starts at $55,100.

▶ *Digital Equipment*
(508) 334-4825

Visual Components, Inc. has introduced Formula One/Net.

According to the Lenexa, Kan., company, Formula One/Net is an Internet spreadsheet component that gives spreadsheet functionality to World Wide Web site content providers and Web browsers and a method for providing interactive Web content. Formula One/Net is the basic component that lets users view, update data and text and interact with embedded Formula One workbooks.

By using Netscape Communications Corp.'s Navigator 2.0 and Formula One/Net, a content provider can embed workbooks in browser windows. Embedded workbooks let Web content providers add data with calculated values, formatted tables and efficient localizable forms to their Web sites.

Formula One/Net is free.

▶ *Visual Components*
(913) 599-6500

AllPen Software, Inc. has announced NetHopper Server, which is a World Wide Web product for Apple Computer, Inc.'s Newton.

According to the Los Gatos, Calif., company, NetHopper Server lets multiple Newtons simultaneously connect to the World Wide Web via a single Macintosh.

NetHopper Server was designed to let users set up a Macintosh gateway application at a corporate office and dial in to a NetHopper Server gateway to pull down information from their Web site.

NetHopper Server works with personal digital assistants that run the Newton 2.0 operating system. Pricing starts at $1,499.

▶ *AllPen Software*
(408) 399-8800

Brooks Internet Software, Inc. has introduced Remote Print Manager.

According to the Idaho Falls, Idaho, company, Remote Print Manager is a server software package that lets users print to a PC across the Internet and enterprise networks. Users send print requests from another computer — including mainframes, Unix and IBM AS/400 workstations or another PC — to their PCs via the standard Internet print protocol, LPR/LPD.

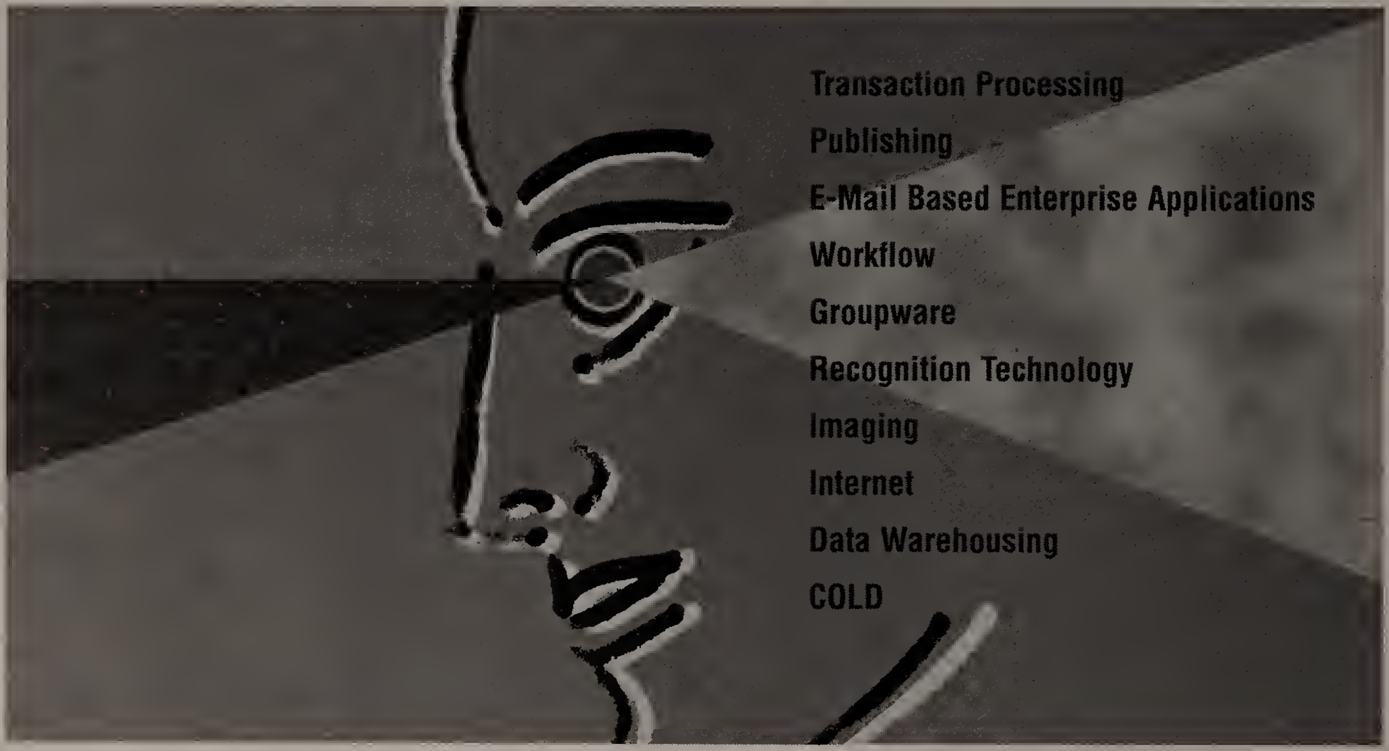
Remote Print Manager supports multiple, independent queues. Each queue can be configured with its own printer, printer setup, fonts and margins.

It can print to local and networked printers by formatting the text or sending it directly to the printer. Remote Print Manager fully supports the LPD protocol for Internet printing and accepts requests from mainframes running MVS, CMS and CICS applications from Unix and AS/400 workstations.

Remote Print Manager costs $40 per unit.

▶ *Brooks Internet Software*
(208) 523-6970

The Vision You Need to Master the Solutions.



AIIM '96 Show & Conference
March 31–April 3 McCormick Place Chicago, Illinois

See how you'll use integrated document management technology to effectively manage your organization's critical information. AIIM '96 provides clear insights and comprehensive knowledge into the latest technologies, methodologies and issues affecting you. Compare thousands of new products and services from over 350 leading companies. Choose from over 100 highly informative conference sessions. Register now to attend the world's largest, most prestigious event in the industry. Sponsored by the Association for Information and Image Management International.

CALL THE AIIM SHOW HOTLINE: 800-477-AIIM

NEW FOR AIIM '96! For Show Registration, Conference or Housing information within minutes, use our FAX-ON-DEMAND Service: 800-853-9152

AIIM '96 SHOW AND CONFERENCE
SAVE $50.00 WITH THIS FREE EXHIBIT PASS
Respond immediately. Coupon must be filled out and returned by March 8 for you to receive your badge by mail. Otherwise, bring this coupon to McCormick Place for FREE on-site registration.
Name
Title
Company
Address
City State Zip
Phone Fax
FAX NOW! 301-588-4838
Or mail to AIIM, 1100 Wayne Ave., Suite 1100
Silver Spring, MD 20910-5603
M06

THE AIIM SHOW & CONFERENCE

RESEARCH TRIANGLE CAREERS
Will be featured in Computerworld's March 4 edition
Deadline: Feb 29, 3pm
1-800-343-6474 x8201

Power Objects.
Because every line of code you write ends up on your face.

Unique drag and drop technology dramatically simplifies applications development.

$99
Introductory Offer
Personal Edition
Over $150 Savings*

Unnecessary and repetitive code takes its toll. On your business, on your mind, and, yes, even your face. But relax. Apple,® the experts in easy to use technology, has teamed up with Oracle, the database experts, to bring you a winning business solution. Oracle Power Objects™.

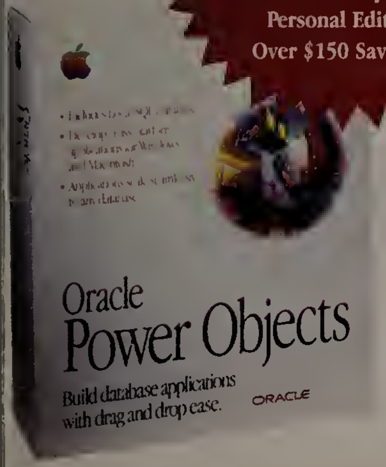
A visual programming tool, Power Objects automates complex database functions by letting you reuse code quickly via drag-and-drop object technology. With Power Objects, you can insert and delete data located on a server DBMS with full transaction support and no coding whatsoever. The same task in Visual Basic would require many redundant lines of code. You can even run Windows app's unmodified on a Macintosh™ computer and vice versa. And Power Objects uses a scripting language you already know, standard BASIC.

To eliminate unnecessary lines of code from your programming, and perhaps elsewhere, buy Oracle Power Objects today, before it's too late. Available for both Macintosh and Windows in the Personal or Client/Server Edition.

	Power Objects	Visual Basic
Drag-and-drop database programming	Yes	No
Integrated SQL database	Yes	Yes
Industry standard BASIC language	Yes	Yes
Seamless scalability to Oracle 7 & SQL Server	Yes	No
Native Oracle 7 & SQL Server interfaces	Yes*	No
True object-oriented code reusability	Yes	No
OCX and OLE 2 support	Yes	Yes
Multiplatform: Windows, Macintosh, OS/2**	Yes	No

* *Standard in the client/server version*
** *Scheduled for release in early '96*

Limited time offer. Order today by calling Apple direct at
1-800-950-5382 ext. 906
visit the Oracle Store at
http://www.oracle.com
or see the reseller nearest you



Mac OS

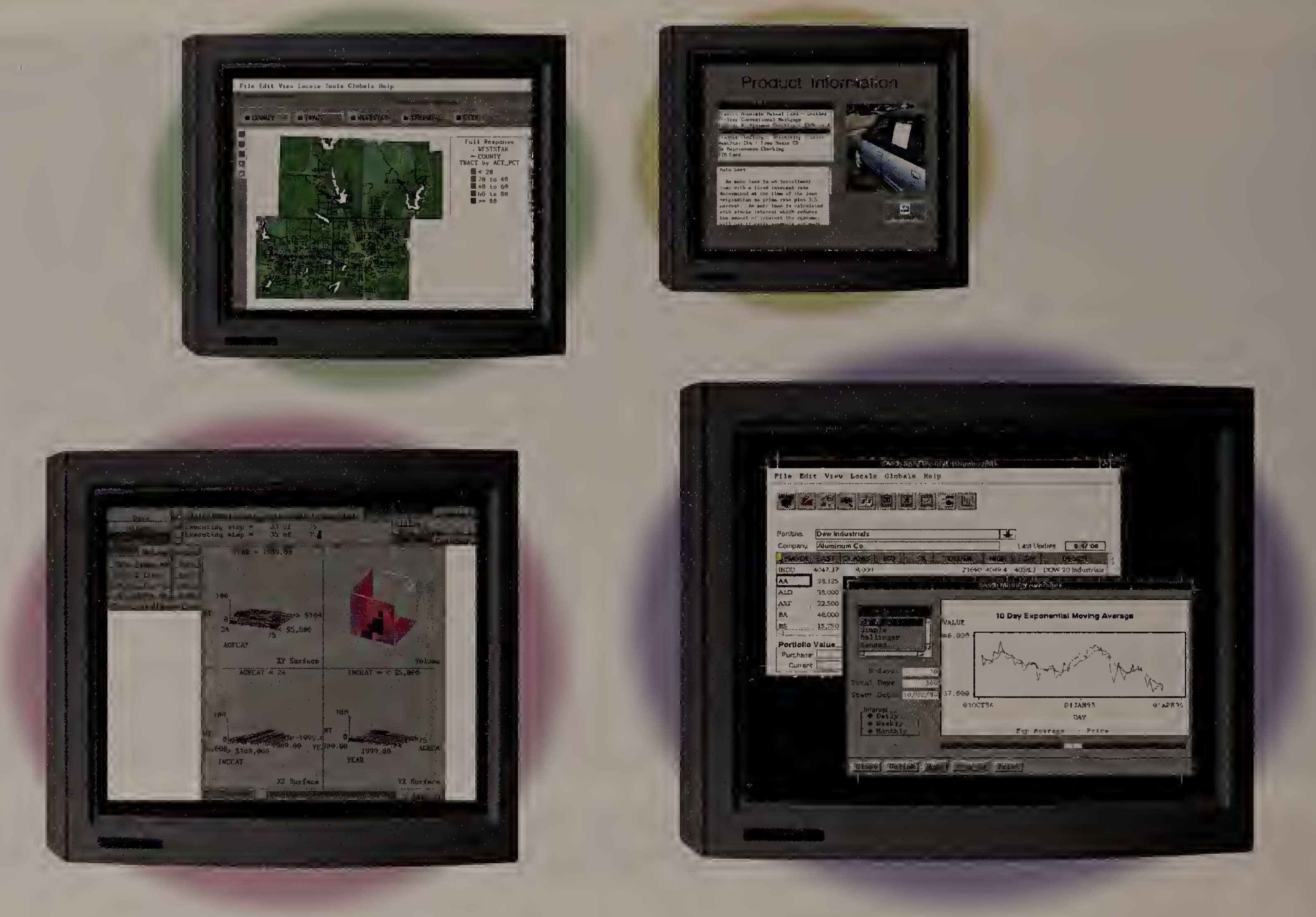
For Windows

ORACLE
Enabling the Information Age

*Offer valid through March 31, 1996. Tax, shipping and handling costs are not included. ©Apple Computer, Inc. All rights reserved. Apple, the Apple logo, the Mac OS logo, and Macintosh are registered trademarks of Apple Computer, Inc. in the U.S. and other countries. Oracle Power Objects and Oracle are registered trademarks of Oracle, Corp. All other trademarks are the property of their respective owners. Prices listed are special promotional prices and reseller prices may vary. Offer valid only in the U.S. and not valid in connection with any other offers. *Based on the regular estimated retail price.*

THE SOFTWARE THAT BROUGHT A TRUE ENTERPRISE VIEW TO THE DESKTOP IS NOW MORE ENTERPRISING THAN EVER.

Orlando



File Edit View Locale Tools Globals Help
Product Information
10 Day Exponential Moving Average

Now premiering on desktops everywhere...a totally new release of the SAS® System, the decision support software that's fully integrated to meet your needs in every area of data access, management, analysis, and presentation.

In addition to enhancements throughout the SAS System, this new release offers such exciting new capabilities as:

- *Multidimensional Data Visualization and Reporting*
- *Geographic Information Systems*
- *Real-Time Analysis of Stocks, Commodities, and Other Financial Instruments*
- *Multimedia Presentations*

...and many more.

The new software also builds on SAS Institute's reputation as a leader in:

DATA WAREHOUSING
...making data easily accessible to decision makers without impacting overall system performance

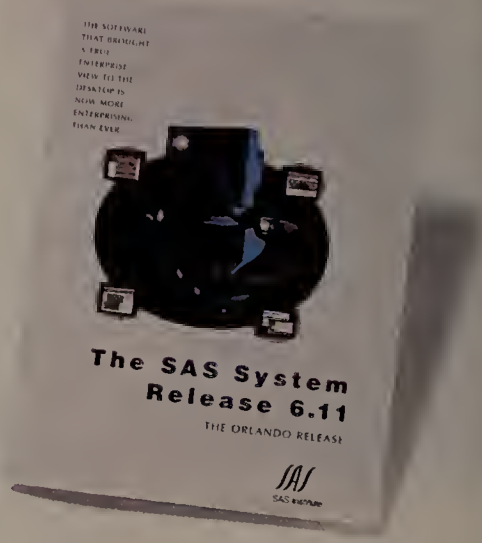
DECISION SUPPORT
...empowering business analysts with tools to handle their own information requests

RAPID APPLICATIONS DEVELOPMENT
...taking an iterative approach to applications design and deployment

ANALYTIC AND TECHNICAL
...exploring data in-depth using the most sophisticated analytical and visualization capabilities

BUSINESS SOLUTIONS
...delivering decision support systems geared to specific business tasks.

Our free guide will acquaint you with all that's new in the SAS System. Just give us a call or send us E-mail at **cw@sas.sas.com**



SAS Institute

Phone 919.677.8200 Fax 919.677.4444
In Canada 1.800.363.8397

For Dates and Locations of Free SAS Seminars,
Visit Us on the World Wide Web at http://www.sas.com/

SAS is a registered trademark of SAS Institute Inc.
Copyright © 1996 by SAS Institute Inc.

Software auditing tool helps insurer cut costs, **76**

Corporate Strategies

The 'cafe' at MCI's Boston Rally Center *is a coffee bar with laptop connections where field representatives can meet to compare notes*

Virtual-office prototype puts field service reps to work at 'hearth' of MCI

By Mindy Blodgett
BOSTON

Words such as "hearth" and "cafe" might bring to mind homey images of a country inn, but at the MCI Rally Center, these are parts of a futuristic virtual office.

The Boston Rally Center started operating last month and is the first of 200 such offices that MCI Communications Corp. plans to roll out in the next year or so. The rally center concept is the second phase of MCI's approximately $75 million investment in a mobile client/server project.

This is one of the largest sales force automation plans ever undertaken. Eventually, more than 5,600 field service representatives

MCI, *page 76*

Pier pressure

Inventory management system helps retailer boost sales

By Thomas Hoffman

Most retailers took a beating over the holidays, and even industry kingpin Wal-Mart Stores, Inc. saw its streak of 99 consecutive profitable quarters laid to rest.

But one notable exception was Pier 1 Imports, Inc., the Fort Worth, Texas-based specialty retailer. Its 20% sales gain in the recent Thanksgiving-to-Christmas period over the year before was aided by a mainframe-based inventory management system.

Roughly 85% of Pier 1's home furnishings and other merchandise are imported, mostly from mom-and-pop manufacturers in the Pacific Rim, according to Jim Deats, the firm's vice president of information systems.

Because these small manufacturers aren't too computer-savvy, Pier 1 set up its agents — companies that track these small shops — with electronic data interchange (EDI) technology through a new inventory management system. With EDI, the agents are better positioned to manage order fulfillment and consolidate and direct the shipment of goods to the retailer.

Four years ago, Pier 1 began installing the inventory management system, which is based on IBM CICS/VSAM and uses homegrown software that runs on an IBM ES/9000 Model 9021 mainframe. Pier 1 modified and fine-tuned the software in 1992 and 1993 to extend it to its trading partners.

By 1994, the company's internal users began learning the nuances of the system. "That helped our user groups to [effectively] manage inventory over 1995, and Christmas validated that," Deats said.

Inventory management systems allow retailers to "reduce the possibility of being out of stock," said Robert Berger, a principal at Berger Advanced Management Services, a Hillsboro, Calif.-based retail consultancy. "The larger companies get, the more difficult it becomes for them to control the flow of merchandise at a distance from their headquarters."

Pier 1's Jim Deats *says the inventory system helps manage import of products from mom-and-pop manufacturers*

The result: better control over inventory dollars, reduced expenses from the refusal of slow-moving goods and improved customer loyalty from keeping goods well stocked.

Pier 1 was aided by other technical improvements over the holiday shopping season, including an upgrade of the communications network that supports its 693 outlets. In July, the retailer began rolling out new communications software over its TCP/IP Ethernet network to speed credit authorizations from its IBM 4693 point-of-sale systems.

The dial-up systems, from Harmonic Systems, Inc., have cut Pier 1's credit authorization times by 50% — to 3 to 5 seconds.

Research laboratory uses desktop ATM for video

By Bob Wallace

Lawrence Livermore National Laboratory believes ATM stands for Advanced Technology that Matters.

The research organization at the University of California is using desktop-based Asynchronous Transfer Mode (ATM) at 25M bit/sec. to support a critical on-demand distance learning application.

ATM is an emerging switching technology that can handle voice, data and video traffic simultaneously. It also can switch that data at higher speeds and more efficiently than most of today's switching gear.

First targeted at users' backbone networks to handle heavy traffic, ATM more recently has become available on the desktop from First Virtual Corp. (FVC), IBM, Madge Networks, Inc. and Whitetree, Inc. These lower-speed, lower-priced desktop ATM wares, however, still aren't priced where most commercial IS shops will buy them, most observers agreed.

Classes on video

For its part, Lawrence Livermore wanted a desktop ATM system for a video application — to broadcast live technical classes, via video, to its staff. When it began looking for a system about 18 months ago, only FVC, with a turnkey video system, supported its requirements of 25M bit/sec.

Low-cost leader

IBM is the price leader for now in 25M bit/sec. ATM products. Its $495 price includes a port on an ATM switch as well as an ATM adapter card.

"We found that the number of people that watched the classes live when they were broadcast had fallen to roughly 1%," said David Dirx, product manager for advanced video research at Lawrence Livermore. That forced the lab to record and deliver tapes to the masses — a timely and costly process.

"We looked at Ethernet switching, but there was no way to guarantee the quality of the video transmissions," Dirx said. ATM, however, supports quality of service, through which users can set parameters to guarantee enough bandwidth is available whenever needed. Quality of service also ensures the quality of both voice and video transmissions, which is important because neither can tolerate delay.

FVC's package came with the Media Operating System, which is optimized for multimedia — not just data — and a super high-capacity storage system that acts as a "video jukebox."

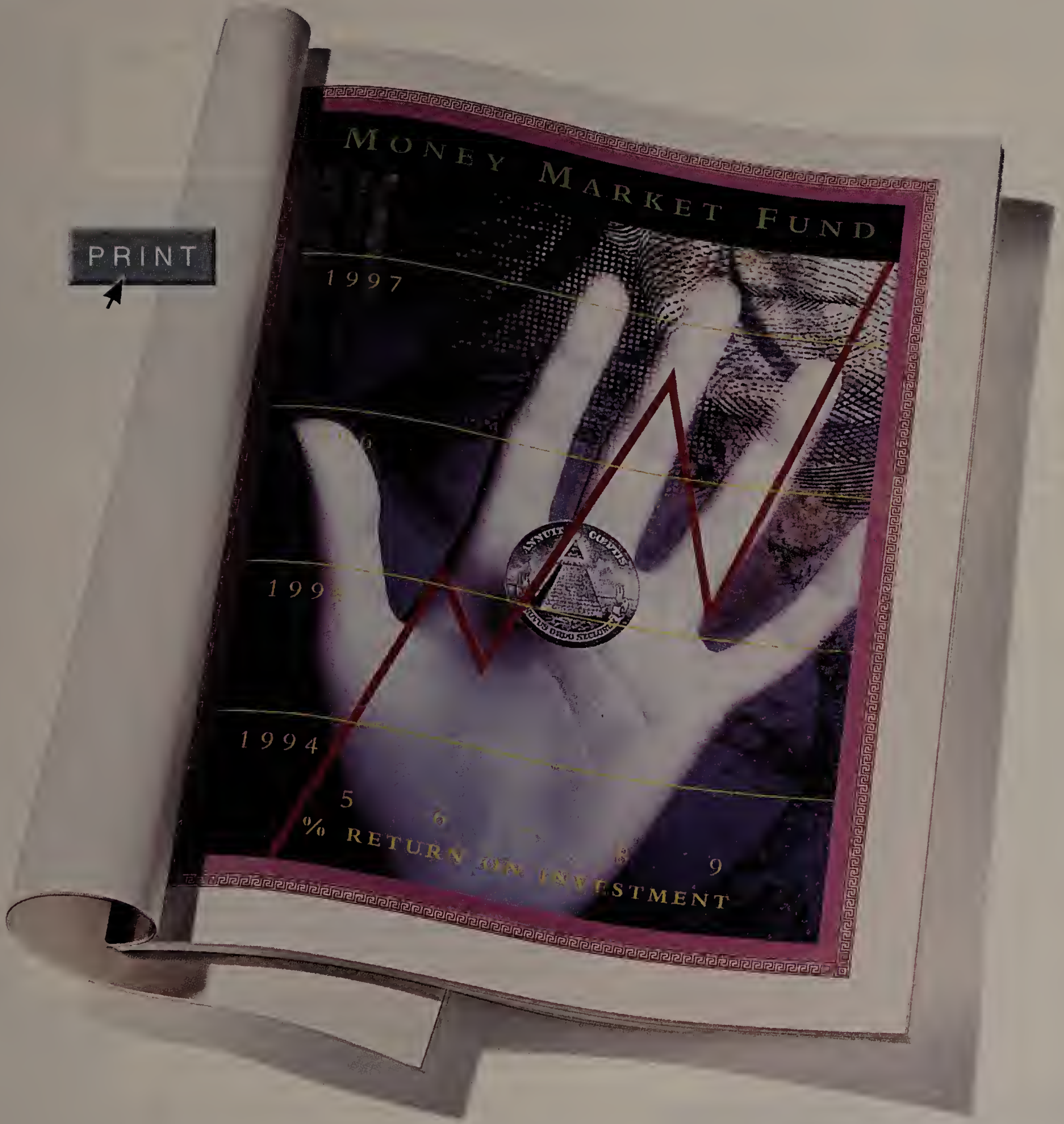
Rather than playing your favorite MTV music video, the jukebox stores video streams for transmission out to desktops when needed, a key capability for Lawrence Livermore.

Pricing wasn't the top concern when the organization decided to go with FVC, but money will be a factor in its deployment of ATM to the desktop. "I can see rolling it out to about 1,000 end users in the next year or so, but that all depends on our budget," Dirx said.

You
brought
them
Windows®
and
e-mail
and
the internet.

Isn't it time you
brought them
lavender,
fuchsia
and
jade?

EPSON COLOR INK JET PRINTERS. *It's not easy to drag the hesitant masses into the future. But it sure is fun. Seeing their eyes go wide. Hearing their expressions of murmured awe. You're standing on the mountain; you can see the promised land. So, where will you lead them? How about into a world of inspiration? Of expression. A world of 720 x 720 dpi of intense, Photo Quality color, and laser caliber text. It's Epson's world. All it takes to get there is about $449 and a little vision. Call 1-800-BUY-EPSON x3400 or see http://www.epson.com.*



The line of Epson color printers starts at $449. Get one, get 720 x 720 dpi of Photo Quality Epson Color, and enter an age of experimentation, kaleidoscope color, unbridled creativity. (And you thought the '60s were over.)

YOU'VE GOT TO SEE IT IN EPSON COLOR.™

Software auditing tool helps insurer cut costs

Firm expects to save $1.7 million by 2000

By Thomas Hoffman

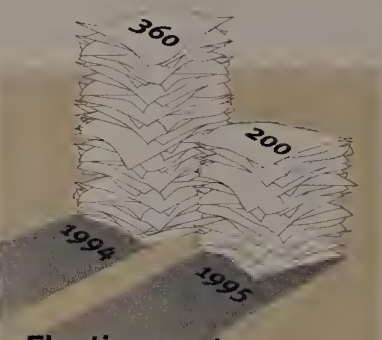
Like other legacy-bound organizations, Blue Cross/Blue Shield of Minnesota was maintaining an inordinate number of mainframe software licenses. By 1993, the number had mushroomed to 360 — a lot more than the insurer was able to track manually with three systems staffers.

"Basically, we were in chaos," said Alan Bain, a senior technical analyst at the St. Paul-based health insurer. "When the bills came in, we didn't know who was using the software, and we often had two or three packages that were doing the same thing."

To get its arms around its software assets, Blue Cross/Blue Shield of Minnesota installed Isogon Corp.'s SoftAudit package, an IBM MVS-based product designed to locate, identify and monitor the usage of all other software on a system.

Since installing SoftAudit in late 1994, the company has narrowed its mainframe software license base to fewer than 200 contracts. With this tool, the company expects to trim its software expenses by $1.7 million through 1999.

The package has already started taking a bite out of expenses. In late 1994, for example, SoftAudit it identified a fourth-generation language (4GL) that only five people were using for ad hoc reporting. Once the end users were consulted, the firm decided to transition them to an SAS Institute, Inc. 4GL already in use. That effort, completed in December 1995, saved Blue Cross $100,000.



Elective surgery

Since installing a software auditing tool in late 1994, Blue Cross/Blue Shield of Minnesota has cut its mainframe software license base from 360 contracts to fewer than 200. With this tool, the company expects to trim its software expenses by $1.7 million through 1999.

Software efficiency

Blue Cross has since consolidated two copies of its Compuware Corp. File-AID data management software, which more than 500 staffers use to browse and edit large VSAM files and IBM IMS databases. In addition, the company used SoftAudit to eliminate one of its two copies of IBM's Distributed Office Support System library management software.

The company also has used SoftAudit to identify its most frequently used mainframe software and negotiate long-term MIPS-based and site licenses. It did so with IBM and Computer Associates International, Inc. last year.

Because Blue Cross licenses IBM software for each CPU, it was able to use SoftAudit to identify where software wasn't being used effectively or at all.

The sum of these efforts has helped the insurer's information systems department meet and exceed a 1995 corporate mandate to reduce software expenses by 10%. Effective software asset management meant the firm underspent its software budget by 25% last year, and it is on target to do the same this year.

MCI

CONTINUED FROM PAGE 73

will work out of rally centers throughout the country.

The Boston center is notable for its mobile workforce deployment, its state-of-the-art technology and advanced office design.

Instead of having to report to an office and a designated cubicle every day, the center's approximately 120 sales representatives can work anywhere, anytime, by using loaded IBM 755CD ThinkPads that connect via client/server software.

> **"This isn't a pilot or a toe-in-the-water project."**
> **—Gil Gordon, Gil Gordon Associates**

Sales representatives can share tips and retrieve data from resources that include a business library that lets users download pamphlets and product features.

The center of the office is the "hearth," a large, wide-open room with muted colors. Modular furniture — including small tables, comfortable chairs and laptop stands — are scattered around and can be moved to suit individuals' needs. Plugs allow laptops to be connected via floors or walls. Large, rolling whiteboards are provided as planning tools or to close off areas during meetings.

At the corner of the room is the "cafe," a coffee bar with laptop connections where field representatives can meet to compare notes. A large video monitor is in another corner.

"Home base" is a locker area where sales representatives keep small rolling files. Before moving into the virtual office, representatives were required to throw out anything they didn't really need and fit everything they considered essential into the rolling storage bins.

Representatives can set up shop for the day in the "heads down" area, which was devised for quiet work.

"The managers roam around too; we share three glassed-in offices [among] 18 managers," said Susan Beckmann, the branch director at the Boston Rally Center. "And we're out on the floor more often than not, not holed up in our offices."

"What MCI has done right is to treat this center concept as a technological development issue as much as a business development issue," said Gil Gordon, a telecommuting analyst at Gil Gordon Associates in Monmouth Junction, N.J. "And not so much for what this will do for space-saving costs, although that will happen too.

"The other thing that will likely make this a successful rollout is that this is very aggressive. This isn't a pilot or a toe-in-the-water project; the Boston center is actually a prototype," Gordon said. "It's the first one out of the box."

Beckmann said MCI hopes the center will raise sales and revenue by as much as 30% in the first year of operations.

MCI uses Xcellenet, Inc.'s RemoteWare 2.0 development tools and an Xcellenet server.

General Electric promises 'net business transactions

By Thomas Hoffman
NEW YORK

Customers and analysts are bullish about General Electric Information Services' new GE InterBusiness service, which was designed to enable member firms to conduct business-to-business transactions over the Internet.

GE InterBusiness uses GEIS' "double challenge" approach and allows for the secure transmission of sensitive data over the Internet. The approach includes a dynamic session key that encrypts each Internet session between sender and receiver.

GEIS expects the service to enable its 40,000 value-added network (VAN) customers and other prospective clients to exchange secured electronic data interchange (EDI) and sensitive electronic messages.

"EDI requires a lot of encryption and data management," said Amie Shapiro, an analyst at International Data Corp. in Framingham, Mass. GEIS' double-challenge technique differentiates it from other Internet-based EDI service providers, Shapiro said.

Daniel DiGregorio, director of technical support at Air Express International in Darien, Conn., said his firm plans to use GEIS' product so its customers and field agents can access a mainframe-based freight tracking system.

Providing Internet-based access to this data to customers in places such as Russia and South America traditionally has been a challenge; VAN services aren't exactly abundant in those regions of the world. GE InterBusiness will help Air Express extend its reach in places that don't have a VAN presence, DiGregorio said.

Briefs

Melville outsources

Melville Corp., the Rye, N.Y., parent company of retail chains such as Kay-Bee Toys and Thom McAn Shoe stores, has outsourced its information systems to **Lockheed Martin Corp.** Under the 10-year, $244 million deal, Lockheed Martin will manage Melville's core IS functions, including accounting, payroll, inventory and stock ordering, through its recently formed **Integrated Business Solutions Co.** unit.

SSA suit dismissed

System Software Associates, Inc. (SSA) said a class-action suit filed against it has been dismissed. Attorneys representing the stockholders who filed the suit dismissed the action voluntarily, the Chicago company said. A second suit, filed by Owens-Illinois, Inc. that charges SSA with fraud and deceptive business practices, remains pending in a Chicago court.

ISSC snags contract

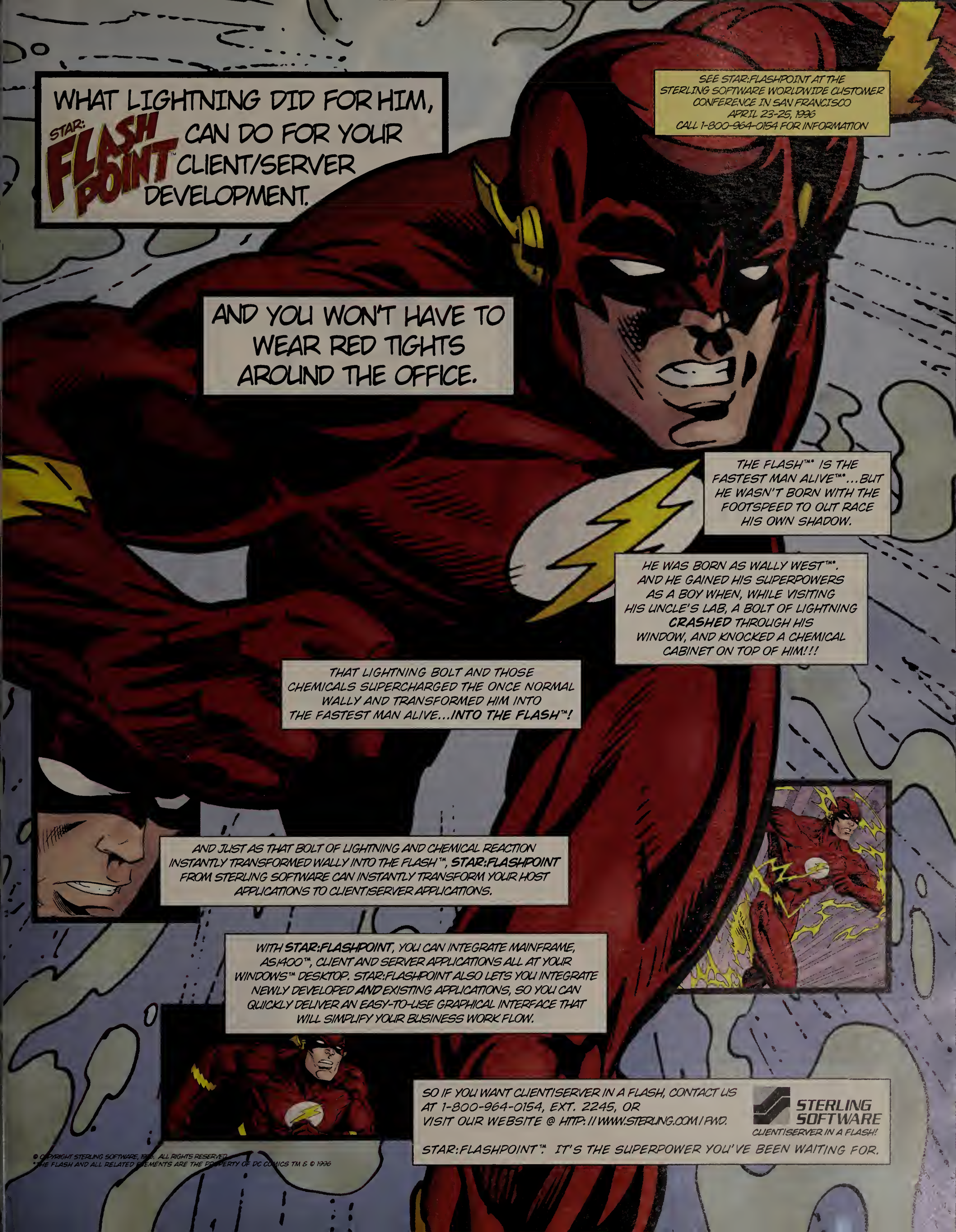
The MetraHealth Cos., a subsidiary of United Healthcare Corp. in Minnetonka, Minn., has signed a 10-year, $540 million outsourcing contract with IBM's **Integrated Systems Solutions Corp.** (ISSC) services unit. Under terms of the contract, ISSC will assume responsibility for MetraHealth's data center operations and support.

Eagle outsources

Eagle Food Centers, Inc. has signed a $50 million outsourcing deal with **SHL Systemhouse, Inc.** Under the deal, Eagle will outsource its data center operations, legacy applications and networked systems management.

Ernst & Young finds ally

Ernst & Young has announced an alliance with **Tata Consultancy Services** in Bombay, India, that will effectively double the Big Six consulting firm's reach in the Asian market. It will give the firm an additional 5,000 consultants and is expected to help it increase its Asian revenue to more than $500 million by 2000, said David Shpilberg, worldwide director of the firm's Information Technology Consulting Services division.



WHAT LIGHTNING DID FOR HIM, STAR: FLASH POINT™ CAN DO FOR YOUR CLIENT/SERVER DEVELOPMENT.

SEE STAR:FLASHPOINT AT THE STERLING SOFTWARE WORLDWIDE CUSTOMER CONFERENCE IN SAN FRANCISCO APRIL 23-25, 1996 CALL 1-800-964-0154 FOR INFORMATION

AND YOU WON'T HAVE TO WEAR RED TIGHTS AROUND THE OFFICE.

THE FLASH™* IS THE FASTEST MAN ALIVE™*... BUT HE WASN'T BORN WITH THE FOOTSPEED TO OUT RACE HIS OWN SHADOW.

HE WAS BORN AS WALLY WEST™*. AND HE GAINED HIS SUPERPOWERS AS A BOY WHEN, WHILE VISITING HIS UNCLE'S LAB, A BOLT OF LIGHTNING **CRASHED** THROUGH HIS WINDOW, AND KNOCKED A CHEMICAL CABINET ON TOP OF HIM!!!

THAT LIGHTNING BOLT AND THOSE CHEMICALS SUPERCHARGED THE ONCE NORMAL WALLY AND TRANSFORMED HIM INTO THE FASTEST MAN ALIVE...**INTO THE FLASH™!**

AND JUST AS THAT BOLT OF LIGHTNING AND CHEMICAL REACTION INSTANTLY TRANSFORMED WALLY INTO THE FLASH™, **STAR:FLASHPOINT** FROM STERLING SOFTWARE CAN INSTANTLY TRANSFORM YOUR HOST APPLICATIONS TO CLIENT/SERVER APPLICATIONS.

WITH **STAR:FLASHPOINT**, YOU CAN INTEGRATE MAINFRAME, AS/400™, CLIENT AND SERVER APPLICATIONS ALL AT YOUR WINDOWS™ DESKTOP. STAR:FLASHPOINT ALSO LETS YOU INTEGRATE NEWLY DEVELOPED **AND** EXISTING APPLICATIONS, SO YOU CAN QUICKLY DELIVER AN EASY-TO-USE GRAPHICAL INTERFACE THAT WILL SIMPLIFY YOUR BUSINESS WORK FLOW.

SO IF YOU WANT CLIENT/SERVER IN A FLASH, CONTACT US AT 1-800-964-0154, EXT. 2245, OR VISIT OUR WEBSITE @ HTTP://WWW.STERLING.COM/FWD.

STERLING SOFTWARE
CLIENT/SERVER IN A FLASH!

STAR:FLASHPOINT™: IT'S THE SUPERPOWER YOU'VE BEEN WAITING FOR.

© COPYRIGHT STERLING SOFTWARE, 1996. ALL RIGHTS RESERVED.
*THE FLASH AND ALL RELATED ELEMENTS ARE THE PROPERTY OF DC COMICS TM & © 1996

Help desks. Data centers. Systems development. *Much of the IS scene is centralizing once more. Join two researchers – and one top CIO – as they go trend-spotting and see how your group compares.*

Change in the Weather

By Allan E. Alter

The wind is shifting again. Centralize or decentralize?

"Whatever direction we're going in now, we'll be going in the opposite direction in five to 10 years," says David Evans, vice president and director of information systems at J. C. Penney & Co. in Dallas. Nevertheless, *Computerworld* asked two of the field's top forecasters — John F. Rockart, director of the Center for Information Systems Research at MIT, and Mike Braude, senior vice president and chief research officer at Gartner Group, Inc. in Stamford, Conn. — to tell us which way the wind is blowing.

And just to keep them honest, we invited Evans to do what any good weatherman does just before he goes on the air: open the window for a reality check.

Bottom line? The decentralization front has just about passed.

Help desks

Here's an area where the trend is to centralize, though our panel doesn't agree on exactly what centralizing is.

Rockart says companies are moving away from running separate help desks for different systems. With client/server computing, help desks must sniff out whether the network, the server or the software caused the snafu. "We will go to major centralized network and systems management and to centralized help desks. But it will take a while," Rockart says.

Braude says two opposite trends are going on. Central corporate help desks are handling basic, simple support problems in about 60% of companies. Trickier questions involving network administration and application problems are being handed to decentralized help desks in 80% of companies. So, for instance, a user who complains he can't log on in the morning will call a central corporate help desk. But if a major purchasing application isn't working right, he will call the specialists.

Evans agrees that central help desks are the way to go. But he wants tools that allow help-desk pros to take control of a user's PC over the network, so they can see the problem for themselves on-line.

Data centers

Companies are consolidating data centers, but few large companies have cut back to just one.

This was a no-brainer for our panel — faster response times, mainframe management tools and low telecommunication costs make it possible to run a worldwide network from a single data center. And by consolidating data centers, companies can reduce labor, software licensing and disaster recovery costs.

Braude adds that movement toward decentralized client/server systems has stabilized. Traditional data centers are now being asked to manage departmental/distributed systems in a centralized manner. In part, that's because companies have yet to find systems and network software that do an adequate job of managing decentralized systems in a decentralized manner.

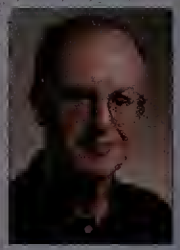
But there are caveats: Most firms are still running at least two data centers, for the sake of disaster recovery. Monster data centers aren't necessarily the cheapest solution, Braude says. "Our data indicates that efficiency [cost per MIPS] in data centers peaks at about 200 MIPS."

Systems development

Moving systems developers out of central IS into business units doesn't look like such a great idea anymore.

Yes, systems developers came to better understand the business, and they got closer to the customer. But many companies no longer need many dispersed devel-

'The pendulum is rebounding from totally decentralized computing'

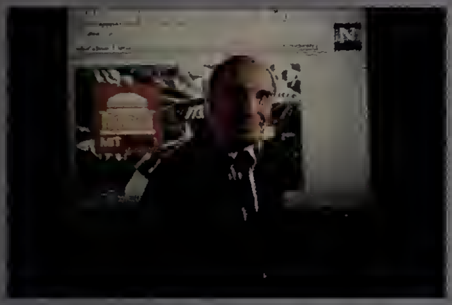

Mike Braude, *senior vice president and chief research officer, Gartner Group*

From 1985 to 1995, PCs and client/server moved too far away from centralized computing. Companies were rebounding from their past dependence on the IS priesthood.

Today, companies are turning away from totally decentralized client/server or network computing, Braude says. The expense and difficulty of managing decentralized computing is one factor. The immobility of mainframe applications and their data is another.

However, the network computing genie is out of the bottle. The pendulum will never swing all the way back. For the next five years and beyond, enterprises will struggle to find the appropriate balance.

There you were, minding your own business, and they went and made you a manager. Now what? Page 80.



John F. Rockart, *director of the Center for Information Systems Research, MIT*

'Global competition is the headline'

Global companies must compete and manage supplies and personnel worldwide, yet their local offices need enough decision-making autonomy to respond to local customers and market conditions. That means IS must develop worldwide standards and centralize information technology purchasing, while making sure that locals have the authority to meet local business and technology needs. This is the force driving the move to "federal" IS organizations, which explicitly divide authority for information technology between central IS and local users, Rockart says.

opers, Rockart says. Corporations are standardizing on software packages and centralizing support functions such as finance and purchasing.

Braude says many companies are having their development staff at different locations report back to central IS. Without that, he says, it's tough to get the synergies, adherence to standards and data-sharing capabilities that today's cross-functional systems require. Braude and Rockart agree it costs more to run a dispersed systems development function than a centralized one.

And Evans? He's sticking with decentralized systems development. His company has been decentralizing systems development and giving users more control and responsibility for systems in their areas. "That seems to be working well for us."

Data

Data will continue to reside on mainframes, departmental systems and personal files, but that doesn't mean distributed databases — networks of local or departmental databases that function like one central database — are finally coming to corporate America.

Rockart says there still isn't software that does a good job supporting the distribution of data, though that may change in the next two years. He says he expects companies to create standards that allow locally stored data to be shared across sites.

Meanwhile, Braude says database replication — local copies of a central database kept synchronized by the database management system — is taking off because of the difficulties in making distributed databases work well.

Evans thinks internetworking can provide an alternative. "This morning, I was reviewing with our controller some confidential information on a secure server. Before, that data would have had to be centralized. Now, anyone the finance department wants to see the data can have access to it. I think the tools are coming to allow data to reside at its most natural level."

Standards and spending

Who makes IS spending decisions — central IS, or business units and departments? Who is really setting technology standards? And who ought to be making these decisions?

Rockart and Braude agree that although user involvement is necessary, central IS should make the spending and standards-setting decisions. Otherwise, technology costs skyrocket.

But the two don't agree on who is making these decisions.

According to Braude, spending and standards-setting authority is being decentralized right out of the hands of IS. IS has lost too much credibility, and desktop machines are too powerful, for IS to dominate spending decisions. "Though the information technology budget may still be large, IS really needs the concurrence of end users to fund any significant initiatives," he says.

Meanwhile, a few dominant vendors such as Microsoft Corp. are setting technical standards in the real world. Companies pay only lip service to independent technical standards. Is it smart for IS to give up control over spending? Not if management is "really concerned with keeping costs down," Braude says.

Rockart believes the old trend toward dispersing spending and standards-setting authority is ending, as companies seek to contain costs and gain economies of scale. But that doesn't mean the chief information officer can act like a czar. Spending and standards decisions require buy-in and cooperation between central IS and local information technology groups, "which can only be gained by jointly agreed upon rules."

Evans is clearly with Rockart: Standards-setting is more meaningful than ever. "Without central standards, you get a dog's breakfast."

Servers

No agreement here.

Centrally managing servers is the sensible thing to do, Rockart says. It's cheaper than having local server gurus handling each server. "We are clearly seeing a larger number of 'server farms' in what used to be the glass houses."

But Braude hasn't seen any big move to server farms or central management. Communications costs could put the kibosh on efforts to centralize servers, he says.

Evans agrees with both. Physical security, file backup and recovery capability are best done centrally, rather than left to amateur administrators, he says. But if servers are distributed over a wide-area network, telecommunications costs and speeds don't permit centralization. ■

Alter is *Computerworld*'s senior editor, Managing.

David Evans, *vice president and director of IS, J. C. Penney & Co.*

'The internetworked world is going to happen'

The Internet is "the data equivalent of a worldwide dial tone," Evans says. It allows companies to network without a central control point. In an internetworked world, he says, companies can centralize or decentralize IS depending on what best fits their business. They don't need to centralize just to accommodate their mainframes.

F.Y.I.

Technical knockout

The MBA is the quintessential degree in a wide range of industries. But in the information systems field, many long for a program that teaches general management skills and provides a big-picture view of technical issues. One answer may be the master's in technology administration, a degree offered at a growing number of colleges.

The leaders in the field are MIT, which calls its degree a master's of science in management of technology, and Stanford University, which calls its program IEEM, or industrial engineering/engineering management.

MIT *professor Steve Eppinger teaches product development*

MIT in Cambridge, Mass., began its program in 1981. Director Rochelle Weichman says students have included computer science majors, systems development managers and principal software engineers.

Jonathan A. Bachman, now a software product manager at Electronic Book Technologies, Inc. in Providence, R.I., looked at both these programs before settling on Stanford. "They were more flexible than MIT. I was able to take seven courses in computer science — almost all of which focused on software product development — along with seven management courses," he explains. Both programs require a year to complete.

"You get about half the material in a typical MBA and about half of a typical master's in engineering," Bachman says. "When you're done [with the program], you know what you don't know in two different areas."

Such breadth may be just the thing for IS professionals, who must constantly weigh the merits of different technologies and changing business requirements.

Other schools with similar programs are the University of Phoenix; the Stevens Institute of Technology in Hoboken, N.J.; Case Western Reserve University in Cleveland; and the University of Minnesota in Minneapolis/St. Paul. The University of California at Berkeley

— *Alan R. Earls*

New Managers

Congrats!
You're a
manager!
Hot dog!
What the
!#@* do I
do now?

FPG INTERNATIONAL CORP.

By Alan R. Earls

You're a talented information technology pro. If you're not a manager already, somebody will ask you to become one soon enough. The change inspires feelings that range from elation to terror.

Suddenly, instead of relying on the boss or complaining about the boss, you are the boss. You're accountable for everything those slugs who report to you do. And you were one of those slugs just last week, so you know full well what it's like.

That's the terror. The elation comes from the increased responsibility, the chance to develop professionally and, let's not forget, the bigger paycheck.

Paul Thompson, newly minted as a project manager at U.S. Healthcare in Blue Bell, Pa., expresses a common concern. "I came straight from a technical position," he says. "I had to make sure the expectations were set for me and my superior." Thompson was concerned that despite his managerial responsibilities, his boss would still expect him to make the code tight. "It is a mind-set that must be changed," he says.

Thompson wrestled his own mind-set before accepting the job. "When you stay technically oriented, you have a career path that is clear," he says. "But management is much more open-ended. Once you make up your mind to take a management job, there should be no turning back."

Bud Baumann, now a division head for information at Cigna Reinsurance, a Cigna Corp. subsidiary in Hartford, Conn., recalls a similar resetting of parameters when he got his first taste of management responsibilities in 1984. His first step was to project leader, a position that came with lots of responsibility but little real power. "I had to learn to convince people to do things for the good of the team," he says. "But if someone wasn't pulling their weight, you would still go in and do it yourself."

Baumann next became an independent contractor. It wasn't until 1991 that he landed what he describes as his first "real" management position: director of Cigna's risk information services.

There, things were different. Although the persuasion skills he had acquired as a project leader came in handy, Baumann says it took a while to get the hang of delegating technical tasks and getting compliance.

Mark Cook began his first management position four years ago running a help desk in a government agency. This job eventually led to his current position as director of computing services at the Columbus School of Law in Washington. He says he knows exactly what the managerial challenge is: people. "You expect them to be cooperative," he says, "but they are worse than incompatible operating systems." In fact, he adds, "people will purposely do malicious things."

Cook says that to survive, he learned to be a good listener, figured out the difference between an employee and a personal friend and, in particular, taught himself to think before talking or sending electronic mail.

And managing people is only one facet of the management challenge, says Wayne Graves, who was recently appointed deputy information systems director at the Association for Computing Machinery in New York. "I came to this position from a systems analyst function. I expected that as a manager, I would be thinking mostly about people." Instead, Graves found, "I really had to keep an eye on the information itself because that is what other people needed from us."

Graves discovered that some of his department's major tasks no longer served users' needs. In fact, one of his first challenges was explaining diplomatically that "the work someone had been doing for years had been getting tossed into the garbage."

But never fear. Managers are often delighted with what they do. Suford Lewis, a national officer in the Association for Women in Computing, recalls fondly her introduction to management during the early 1980s. "It was a vivid couple of years that were mostly marked for me by delight and the terror that I would do something terribly wrong," she says. "I was always delighted to discover that I could suddenly do so much to move a project forward, yet I was terrified that I wouldn't have enough real power to have a permanent effect."

Getting past that queasiness and learning that even with feet of clay, a manager can make a difference, is the big payoff. ■

Earls is a freelance writer in Franklin, Mass.

We asked a dozen information technology managers, some recent arrivals and others with several years' experience, what advice they would offer newcomers. Here are the common themes:

- Don't be afraid to hire people more talented than you.
- Some of your decisions will always backfire.
- Your peers and superiors are much more likely to stab you in the back than are your direct reports.
- You can't know it all. Find sources of expertise you can rely on.
- As a manager, you shouldn't be the one who saves the day. Instead, hire day-savers.
- Technical people tend to seek technical solutions. As a manager, you must make choices based on cost and time, not technical elegance.
- Figure out what skills are weakest on your team so you don't get blind-sided in that area.
- Don't sit around waiting for the perfect solution to walk in your office.

F.Y.I.

Executive Track

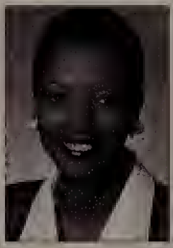
Kathy Cruz is the new chief information officer and vice president of information services at **VeriFone, Inc.**, a provider of transaction automation systems in Redwood City, Calif. She will report to Joseph M. Zaelit, the company's vice president of finance and administration and chief financial officer.

William E. Eager is joining **CSC Consulting and Systems Integration** as a partner. His Cincinnati-based practice will focus on re-engineering and IS organizational effectiveness.

Eager is a former senior vice president and CIO of Community Mutual Insurance Co.

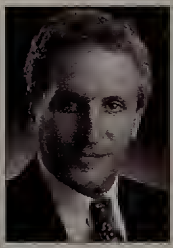
The Arbitron Co. has appointed **Stan Burrows** as CIO. Previously, Burrows was a senior software engineering manager at Lotus Development Corp. in Cambridge, Mass.

Burrows will be responsible for all software development at the New York-based media information company.



Melodie Mayberry-Stewart was recently named vice president and CIO at **Beth Israel Medical Center** in New York. In addition to IS, including clinical systems, she will oversee telecommunications network development at the health care center.

For the past four years, Mayberry-Stewart was vice president and CIO at St. Thomas Hospital in Nashville. Prior to that, she worked for IBM.



Marc Rubinger is the new CIO at **Genesis Health Ventures** in Kennett Square, Pa. He will report to Michael R. Walker, the health care provider's chairman and CEO.

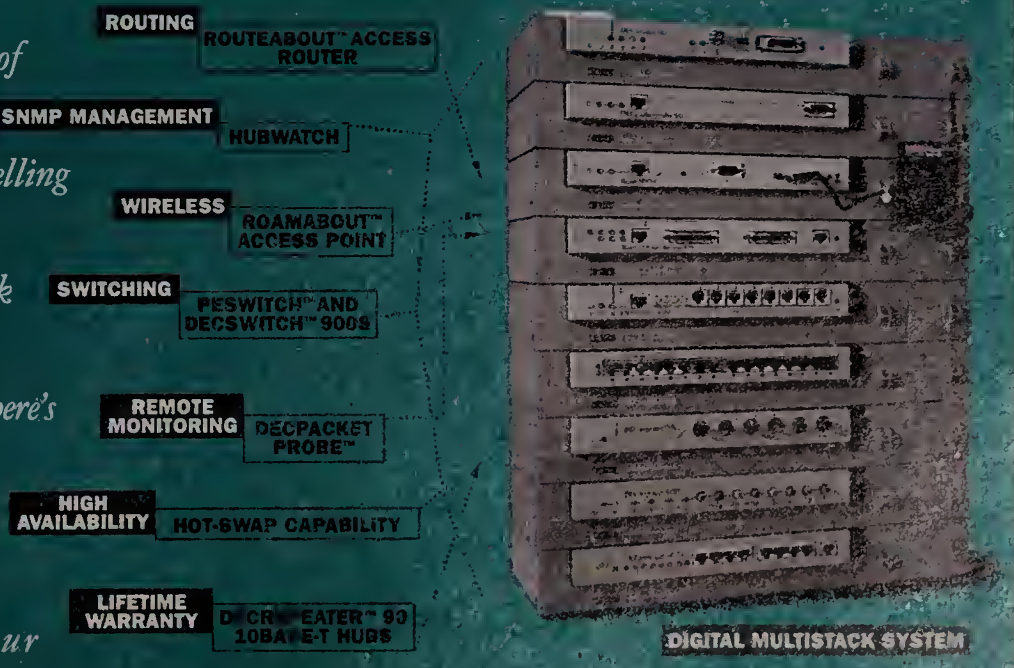
Rubinger was previously a vice president of IS at Shared Medical Systems.

John R. Witsken has been named staff director and CIO at the **Institute of Electrical and Electronics Engineers, Inc.** He will be responsible for managing the Piscataway, N.J., technical society's computing, communications and application development. Previously, Witsken worked at Bell Communications Research, Inc.

WE COULDN'T DECIDE WHETHER TO TELL YOU ABOUT THE STACKABLE THAT OUTFUNCTIONS THE COMPETITION, OR THE ONE THAT UNDERPRICES THEM.

LUCKILY, IT'S THE SAME ONE.

Decisions, decisions. Do we rave that the Digital MultiStack System has the most robust functionality in the industry? That it delivers local, remote and Internet access—not to mention wireless—so it's ideal for even the most widespread enterprises? Or should we talk dollars and cents: a starting price less than $50 per port, well below HP, 3COM and Bay Networks? Should we talk about Digital MultiStack's exceptional scalability? (It lets you add routers, switches, access servers, traffic analyzers, bridges and hubs as needed. Up to 16 hot-swappable hubs and 232 ports. So your network stays up and running, yet grows as your company does.) Or would you rather hear that our 10BaseT repeaters come with a lifetime warranty? Should we remind you that only Digital gear can be stacked or racked or chassis mounted or distributed between floors? And then managed effortlessly as a single domain with HUBwatch,™ Digital's low-cost management application? And what about an easy migration path to virtual networking? Only Digital MultiStack has one, thanks to enVISN: Digital's blueprint for the future of networks. Gee. With so many compelling reasons to pick a Digital MultiStack System, it seems there's only one choice after all. For more information contact your authorized Digital reseller or call us at 1-800-457-8211. Or e-mail to lbg@sectra.enet.dec.com.



DIGITAL MULTISTACK SYSTEM

digital™

Novell Labs Tested & Approved

enVISN

©1995 Digital Equipment Corporation. Digital, the DIGITAL logo, HUBwatch, Roamabout, Routeabout, DECpacketprobe, DECrepeater, [illegible] and PEswitch are trademarks of Digital [illegible]
All other products are trademarks or registered trademarks of their respective companies.

THE WEB AND LOTUS NOTES WORK BETTER WHEN THEY WORK TOGETHER.

At this very moment, the World Wide Web is opening up a whole new class of intra- and inter-enterprise applications. Anyone with a Web browser has the freedom to search and browse millions of pages of information. It's possible to deliver information about your company and its products and services directly to millions of prospective customers.

As Web applications and tools evolve, it's critical that they incorporate many of the robust capabilities you've come to expect in traditional host- or PC-based systems.

Imagine Web applications that offer flexible tools for searching, querying, and incorporating

©1996 Lotus Development Corporation, 55 Cambridge Parkway, Cambridge, MA 02142. Lotus and Lotus Notes are registered trademarks and Notes is a trademark of Lotus Development Corporation.

For more information on Lotus Notes or for a copy of our White Paper: Lotus Notes and the Internet, call 1-800-828-7086, extension B589 (1-800-GO-LOTUS in Canada). Or explore Lotus on the World Wide Web at www.lotus.com.

Lotus.

The power of people
working together.

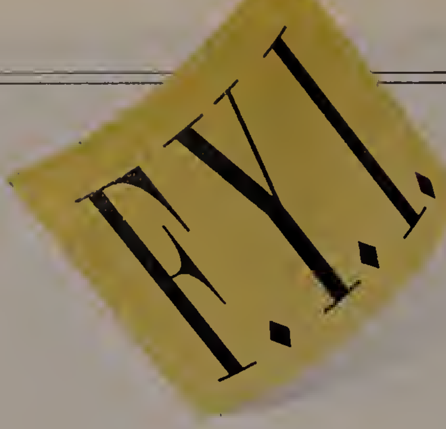
information whether it's on the Web or within your in-house legacy applications. Imagine distributed authoring tools that allow anyone to easily create and manage Web information. Imagine forms-routing and workflow tools that integrate Web information with your current business processes. Imagine robust and flexible security to ensure that only the people who should have access do have access. And imagine being able to utilize this information even when you're on the road.

Well, stop imagining. It's all here now, with Lotus Notes® Release 4 working with the Web. Whether you're currently using Lotus Notes or not, it is the affordable way to create rich, integrated applications that help you and your customers take full advantage of what the Web offers. With Lotus Notes, there's no reason to wait to get the Web working harder for you.

" The most complete Internet strategy
for corporations I have heard so far
is Lotus! That's for the simple reason
that Lotus has the best product
to marry the Internet -- Notes."

John Dodge

PC WEEK DEC. 18, 1995



Doh!

Ten dumb mistakes. That's what the Center for Project Management in San Ramon, Calif., found when it examined 24 projects in nine information technology organizations. So many departments reported making the same goofs that the center compiled a list.

When the list was complete, the center presented it to 50 conference attendees and asked them to grade their organizations on each mistake. Average grades ranged from C+ to D.

In all fairness, the information technology organizations that were originally studied were severely late or over budget with projects; they had turned to the center for help. Nevertheless, do any of these doozies ring a bell in your department?

Ten dumb mistakes

➊ **Mistaking every half-baked idea for a viable project.**

➋ **Overlooking the stakeholders, forgetting the champions and ignoring the nemeses.**

➌ **Not assessing project complexity.**

➍ **Not developing a comprehensive project charter.**

➎ **Not developing a comprehensive project plan.**

➏ **Not designing a functional project organization.**

➐ **Accepting or developing unrealistic and unachievable estimates.**

➑ **Accepting status reports that contain mostly "noise" and not enough "signal."**

➒ **Looking back and not ahead.**

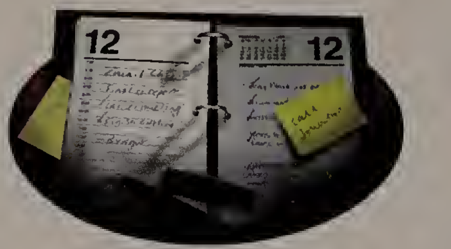
➓ **Not following a robust project process architecture.**

New ideas, anyone?

Would you like to hear how companies such as Toyota and AT&T gather customer feedback and turn it into new and better products? Or how General Motors and Becton Dickinson benchmark themselves against competitors? And would you like to hear it straight from managers at these companies?

Then there's an event you ought to check out: the third conference on "Defining New Products & Services: Best Practices for On-Target, On-Time Results." It's being held in Orlando, Fla., March 31 to April 3.

You probably won't find many information systems managers there. The sponsor, The Management Roundtable in Waltham, Mass., tends to draw marketing, product development and manufacturing types to its events. But if you're looking for new ways to use information to build customer-pleasing products and services, this event could be just the thing. For more information, call (800) 338-2223.



April Workshops

Most workshops are offered later in the year in other cities. To find the time and location most convenient for you, call the contact phone number.

Learning Today's Team-based IS Organization. Providence, R.I., **April 1-2**; Boston, **April 11-12**. Fee: $750. Contact: QED Information Sciences, Inc., Wellesley, Mass. (800) 395-1109.

Re-engineering the Computer Help Desk. New York, **April 1-2**; Washington, **April 18-19**. Fee: $895. Contact: Data Tech Institute, Clifton, N.J. (201) 478-5400.

Communication and Interpersonal Skills: A Seminar for Technical Professionals. New York, **April 1-3**; San Francisco, **April 15-17**; Atlanta, **April 22-24**. Fee: $1,195 to $1,375. Contact: American Management Association, New York, N.Y. (800) 262-9699.

Specifying and Managing Software Requirements. Boston, **April 2-5**. For project managers who develop requirements specifications. Fee: $1,495 to $1,995. Contact: The Learning Tree International, Inc., Reston, Va. (800) 843-8733.

Doug Engelbart;
three buttons

Project Management: Skills for Success. Los Angeles, **April 2-5**; Boston, **April 23-26**. Fee: $1,495 to $1,995. Contact: The Learning Tree International, Inc., Reston, Va. (800) 843-8733.

Measuring and Controlling Software Projects. Orlando, Fla., **April 8-10**. Fee: $845 to $945. Contact: Quality Assurance Institute, Orlando, Fla. (407) 363-1111.

Process for Installing a TQM System. Columbus, Ohio, **April 8-12**. For IS professionals implementing a total quality management system. Fee: $1,195 to $1,395. Contact: Quality Assurance Institute, Orlando, Fla. (407) 363-1111.

Business Process Re-engineering: Strategies, Techniques and Tools. Los Angeles, **April 9-12**. Fee: $1,495 to $1,995. Contact: The Learning Tree International, Inc., Reston, Va. (800) 843-8733.

Effective Skills for Technical Managers. Boston, **April 9-12**; Washington, **April 23-26**. Fee: $1,495 to $1,995. Contact: The Learning Tree International, Inc., Reston, Va. (800) 843-8733.

Identifying and Confirming User Requirements. Boston, **April 9-12**; Washington, **April 30-May 3**. For those responsible for identifying user needs in a project. Fee: $1,495 to $1,995. Contact: The Learning Tree International, Inc., Reston, Va. (800) 843-8733.

Systems Analysis and Design for Information and Business Professionals. Chicago, **April 9-12**. Fee: $1,350 to $1,550. Contact: American Management Association, New York, N.Y. (800) 262-9699.

Improving Your Internal Consulting Skills: For IS Professionals. New York, **April 10-12**; Phoenix, **April 24-26**. Fee: $1,295 to $1,490. Contact: American Management Association, New York, N.Y. (800) 262-9699.

Information Systems Project Management. New York and Seattle, **April 10-12**; Chicago, **April 17-19**; Washington, **April 24-26**. Fee: $1,295 to $1,490. Contact: American Management Association, New York, N.Y. (800) 262-9699.

Understanding Client/Server Computing: Planning, Designing and Implementing a Client/Server System. Orlando, Fla., **April 11-12**; Atlanta, **April 18-19**; Detroit, **April 25-26**. Fee: $895. Contact: Data Tech Institute, Clifton, N.J. (201) 478-5400.

Communicating with IS Clients and Customers. Fairfield, N.J., **April 15-16**; Philadelphia, **April 22-23**. Fee: $750. Contact: QED Information Sciences, Inc., Wellesley, Mass. (800) 395-1109.

Internal Consulting: Creating Customer Satisfaction. Boston, **April 15-16**. Fee: $750. Contact: QED Information Sciences, Inc., Wellesley, Mass. (800) 395-1109.

Strategic Information Systems Planning. Washington, **April 15-17**. For senior managers. Fee: $1,350 to $1,550. Contact: American Management Association, New York, N.Y. (800) 262-9699.

The Crossing the Chasm/Inside the Tornado Seminar Series. Redwood City, Calif., **April 16-17**. For managers and those who incorporate information technology into the enterprise. Fee: $1,285 to $1,395. Contact: Marketwise, Inc., Boulder, Colo. (800) 300-3846.

Workflow: Joining the Islands of Automation. Denver, **April 18-19**. Fee: $1,095 to $1,295. Contact: Delphi Consulting Group, Boston, Mass. (617) 247-1025.

High Tech Procurement Workshop. Short Hills, N.J., **April 22-24**. Fee: $1,395. Contact: International Computer Negotiations, Inc., Winter Park, Fla. (407) 740-0700.

Information Management: The Next Generation. Denver, **April 22-25**. Fee: $475 to $1,950, depending on days attended. Contact: Delphi Consulting Group, Boston, Mass. (617) 247-1025.

Re-engineering: The Leadership Perspective. Chicago, **April 24**. For senior managers involved in or considering a re-engineering effort. Fee: $1,500. Contact: Hammer and Co., Cambridge, Mass. (617) 354-5555, ext. 106.

Software: Issues, Contracts, Negotiations. Short Hills, N.J., **April 25-26**. Fee: $995. Contact: International Computer Negotiations, Inc., Winter Park, Fla. (407) 740-0700.

Managing Telecommunications: Technologies Your Company Can't Do Without. Atlanta, **April 25-26**. Fee: $1,250 to $1,435. Contact: American Management Association, New York, N.Y. (800) 262-9699.

Quality Review Techniques for Information Technology Professionals. Atlanta, **April 29-30**. Fee: $1,195 to $1,375. Contact: American Management Association, New York, N.Y. (800) 262-9699.

Leasing Negotiations Workshop. Chicago, **April 29-May 1**. Fee: $1,395. Contact: International Computer Negotiations, Inc., Winter Park, Fla. (407) 740-0700.

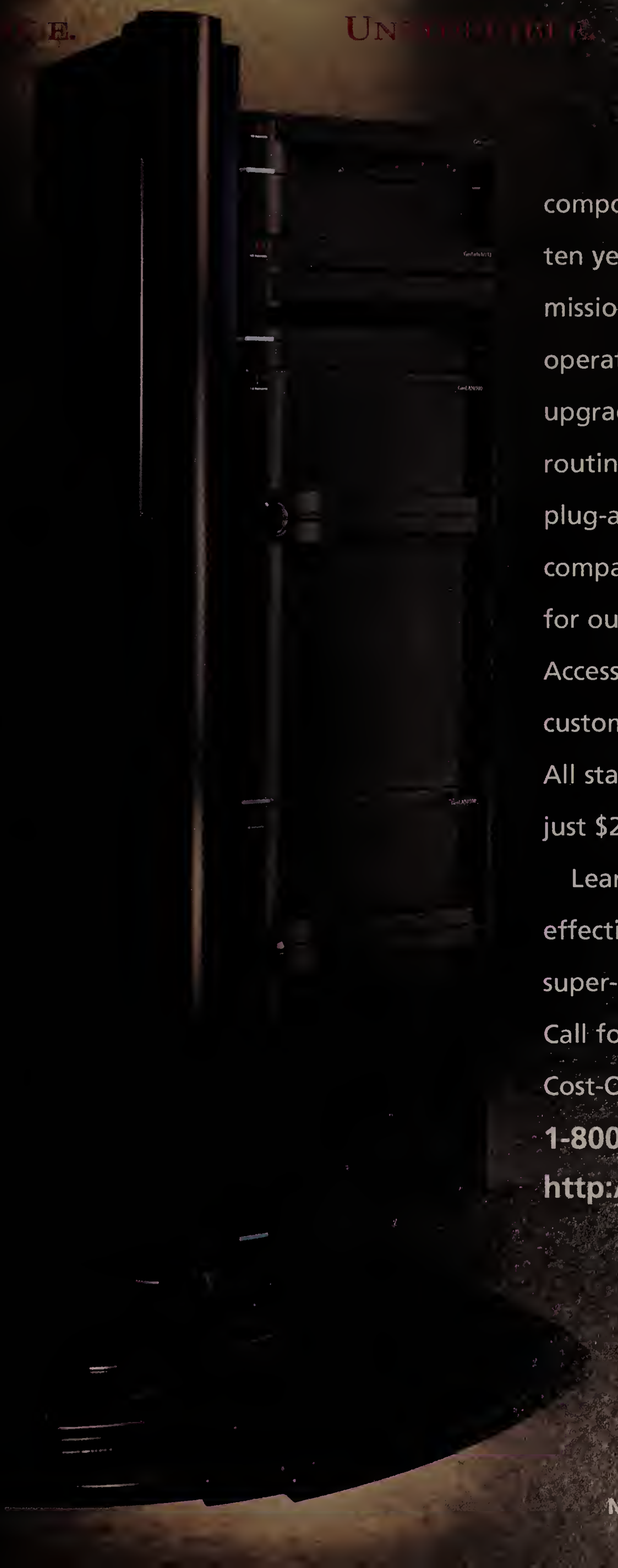
Calendar announcements should be submitted at least six weeks prior to the event and include the title of the event, dates, location, theme or focus, keynote or major speakers, principal topics and a contact person, organization and phone number.

SEND ANNOUNCEMENTS TO:

Steve Ulfelder, Associate Editor/
Management, Computerworld,
500 Old Connecticut Path, Framingham,
Mass. 01701. Fax: (508) 875-8931.

GeoLAN/500.

The State Of The Art In Super-Switching Hubs.



As the first ATM-ready hub to cost-effectively integrate multiple technologies to support shared and switched LAN connectivity, the GeoLAN™/500 switching hub is an affordable starting point for your migration to high-bandwidth networking.

GeoLAN/500 is scalable from 440Mbps to over 10Gbps throughput. Enough to handle the most demanding enterprise network applications.

It's designed for security and serviceability, with integral switching, full redundancy, and hot swappability for all common components. For the next ten years of NonStop®, mission-critical network operation – even during upgrades and routine maintenance. Plus plug-and-play compatibility for our Access/One® customers. All starting at just $250/port.

GeoLAN/500 is available as a standalone hub or in the tower configuration shown at left.

Learn how to cost-effectively upgrade to super-switching hubs. Call for our LAN Cost-Of-Ownership study.

1-800-777-4LAN

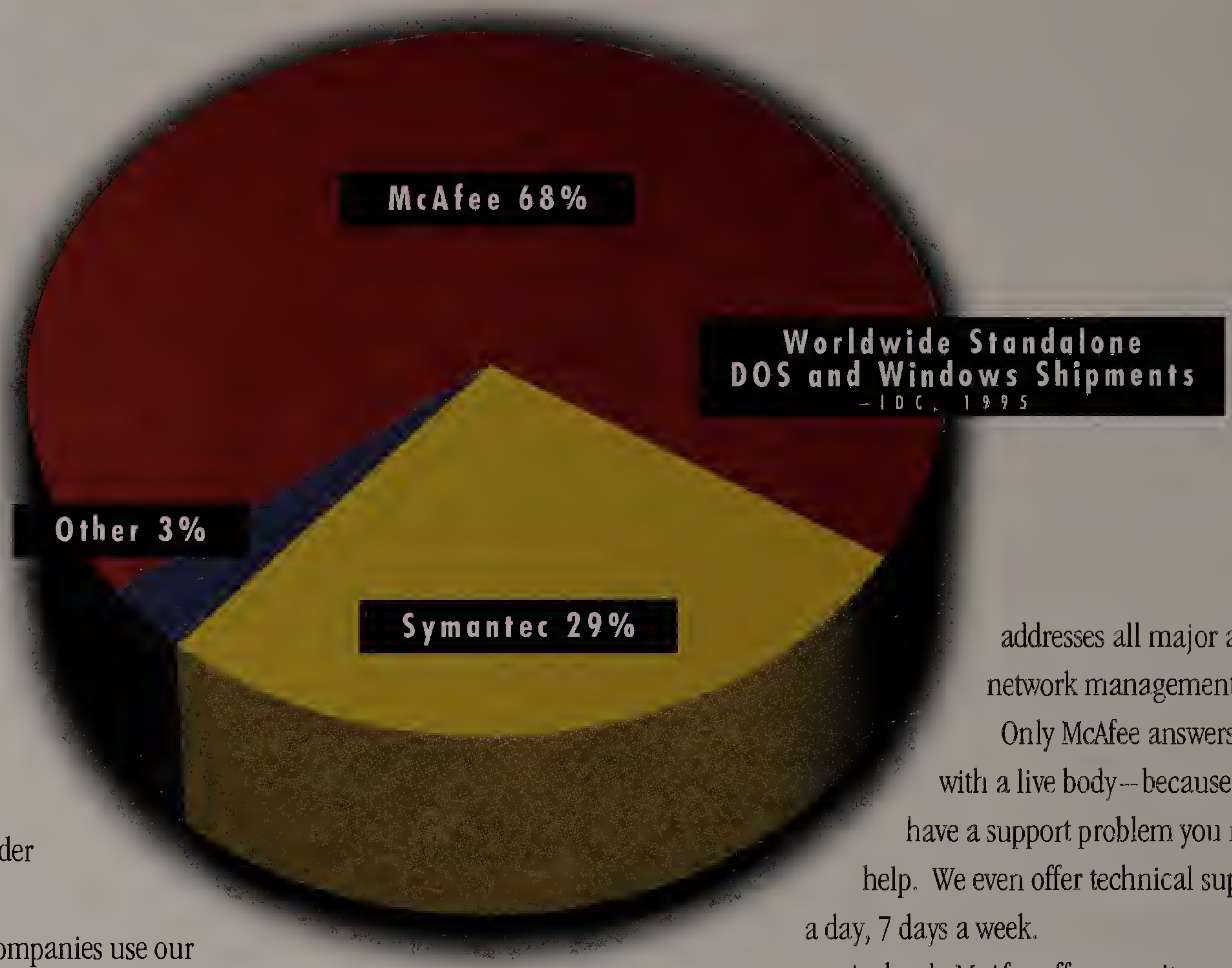
http://www.ub.com

UB Networks

NonStop® Networking.

World Headquarters, UB Networks,
3900 Freedom Circle, Santa Clara,
CA 95054, USA. + (408) 496-0111
or fax + (408) 970-7337. Access/One is a
registered trademark and UB Networks and
GeoLAN are trademarks of Ungermann-
Bass Networks, Inc ©1996 Ungermann-
Bass Networks, Inc. NonStop is a registered
trademark of Tandem Computers Incorporated in
the U.S. and other countries. All rights reserved.

HOW THE WORLD'S BIGGEST ANTI-VIRUS COMPANY



McAfee has raised the bar on network management.

You may know us as the leader in anti-virus software, but did you know McAfee is also the world's largest provider of PC network management products?

In fact, eighty of the Fortune 100 companies use our products. And next year McAfee will be one of the top 25 software companies in the world. That's because we've pioneered new and innovative ways to give customers what they need.

Unlike our shrink-wrap competitors, McAfee provides fully-functioning versions of our products that you can download from the Internet. Free. So you can immediately evaluate any McAfee product anytime, day or night.

Only McAfee lets you download any product for a free trial – with no time bombs.

Unlike our shrink-wrap competitors, only McAfee's complete product line addresses all major aspects of network management.

Only McAfee answers your call with a live body—because when you have a support problem you need instant help. We even offer technical support 24 hours a day, 7 days a week.

And only McAfee offers on-site consulting to ensure that our products provide the solutions you envisioned.

We also give you a known cost of ownership with a subscription plan that makes all upgrades, updates and technical support free for two years.

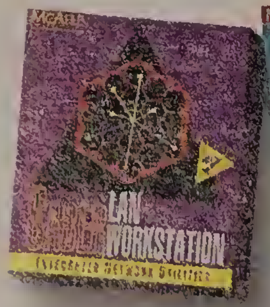
And we're adding new innovations all the time.

SCALEABLE to the Enterprise

The broadest product line with the fullest feature sets.

McAfee offers the greatest variety of network management solutions. You can choose from our top-rated point products and trade up to our powerful integrated suites when you're ready. Or you can select those suites today for maximum control over your entire network.

No matter what you need, McAfee can supply it. And support it. As a single vendor, we also ensure that our products work together seamlessly.

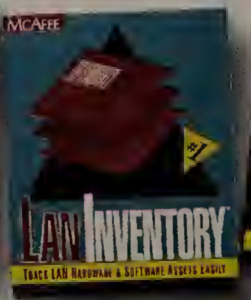


Integrated asset management, desktop management, and server backup.

Integrated software metering, inventory, software distribution and help desk.

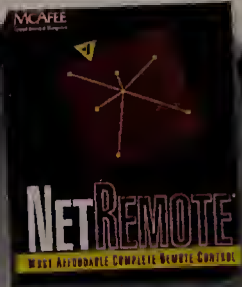
The leader in enterprise software metering.

Reduces the cost of enterprise software distribution.



Easily tracks all LAN hardware and software assets.

Centrally manages Windows 3.1, 95, and NT on networks.

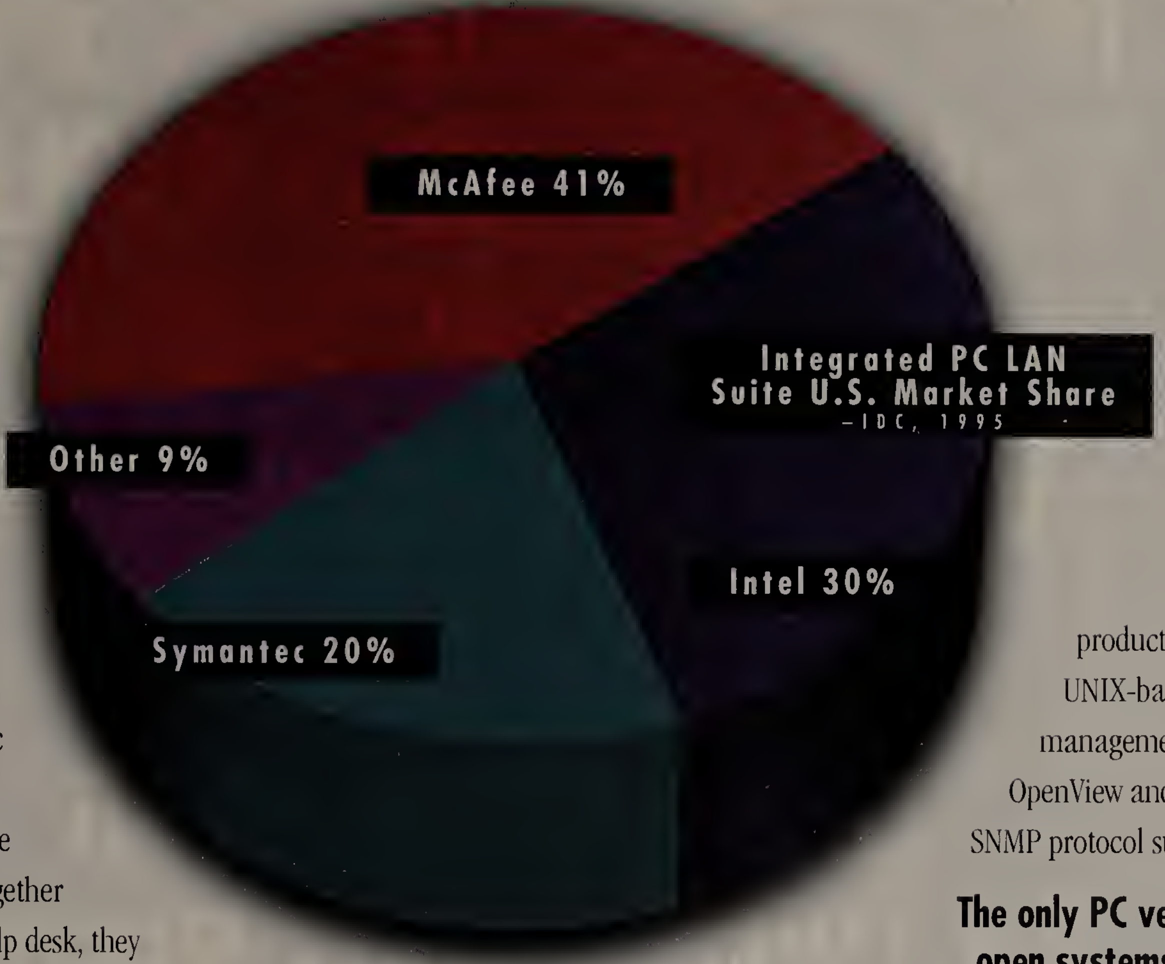


The most affordable and complete remote control.

Centralized help desk problem tracking for users or customers.

Telephone (408)988-3832 Fax (408)970-9727 © McAfee Associates, Inc., 1995. All rights reserved. All brands and products are trademarks of their respective holders.

BECAME THE WORLD'S BIGGEST PC NETWORK MANAGEMENT COMPANY.



Our asset management point products include *SiteMeter* software metering, *SiteExpress* electronic software distribution and *LANInventory* hardware and software inventory management. Together with *LAN Support Center* help desk, they comprise our *BrightWorks* integrated suite.

yes
It runs with NetWare

We also provide desktop configuration management and asset management through *Saber LAN Workstation.* And *Saber LAN Workstation* is the only suite that includes server backup and full server management. No other product offers such a broad feature set.

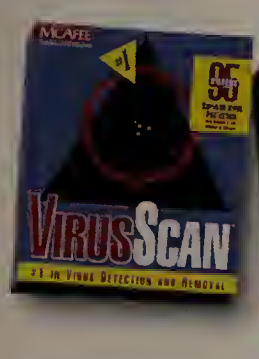
Full cross-product integration across the entire enterprise.

Only McAfee gives you full TCP/IP support so that our products scale from the department LAN to the enterprise WAN.

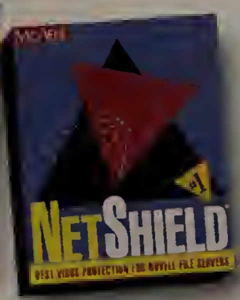
Of course, we use common data formats, reporting, alerting, agents and scripting across all our modules. All of which are accessed from a central management console.

McAfee's management products can scale individually or as part of a suite. Each one serves as a modular, interoperable building block in McAfee's total enterprise systems management approach.

We're also the only vendor to have designed specifically for the Netware 4.1 NDS and Windows NT environments. So you can take advantage of your specific NOS rather than accept our competition's less capable, NOS-independent products. Plus, we integrate into UNIX-based enterprise network management consoles such as HP OpenView and IBM NetView via the SNMP protocol suite.



World's best virus detection and removal for DOS, OS/2, Windows 3.1, 95, and NT.



Comprehensive, top-rated virus protection for NetWare and NT file servers.

The only PC vendor providing open systems architecture.

To give the network manager even greater flexibility, McAfee developed *LANOpen*,™ an industry-standard open architecture for use with all LAN management applications.

LANOpen allows you to mix and match management packages from different vendors. You can even share information between different applications. So you can use the application that best meets your needs.

And to enhance the open systems environment, we're also working with the DMTF on the DMI standard.

For more information on the network security and management software, support, and innovations that built the industry leader, call McAfee today at **1-800-332-9966.** Find out how raising the bar the highest has made us the biggest.

	McAfee	Intel	Symantec
Enterprise Support			
Multi Server	X	X	X
Netware & Windows NT	X	NO	X
TCP/IP WAN	X	NO	NO
SNMP UNIX	X	X	NO
SQL	X	NO	NO

Only McAfee supports you across the enterprise.

	McAfee	Intel	Symantec
Products			
Asset Management	X	X	X
Anti-virus	X	X	X
Remote Control	X	NO	X
Storage Management	X	NO	X
Desktop Management	X	NO	NO
Help Desk	X	NO	NO
Performance Tuning	X	NO	NO

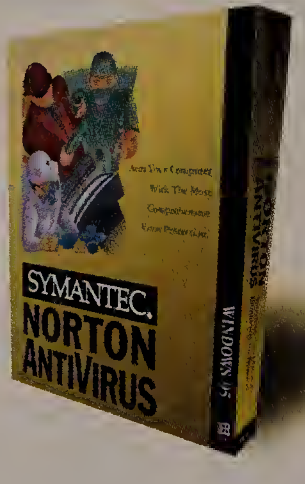
McAfee offers the broadest product line available.

MCAFEE
Network Security & Management

Download MCAFEE | WebServer: www.mcafee.com | Internet: McAfee.com | BBS (408)988-4004 | America Online: MCAFEE | CompuServe: GO MCAFEE | The Microsoft Network: GO MCAFEE

NORTON ANTIVIRUS GIVES YOU THE MOST COMPLETE PROTECTION AGAINST WORD MACRO VIRUSES.

JUST SOMETHING TO THINK ABOUT BEFORE TRUSTING MCAFEE.



If you're using Microsoft Word, get the maximum protection against Word macro viruses. Get Norton AntiVirus. It detects and repairs Word macro viruses automatically. You'll sleep better at night. And you'll be more productive during the day. Call 1-800-822-6417 ext. 9B66 or visit us on the Web at www.symantec.com.

SYMANTEC.®

Comparison based on information available on February 15, 1996. Symantec and Norton AntiVirus are trademarks of Symantec Corporation. Word is a trademark of the Microsoft Corporation. All other brand names or trademarks are the property of their respective owners and are neither associated with nor endorse Norton AntiVirus. ©1996 Symantec Corporation. All rights reserved. In Canada, call 1-800-365-8641. In Australia, call 2-879-6577. In Europe, call 31-71-353111.

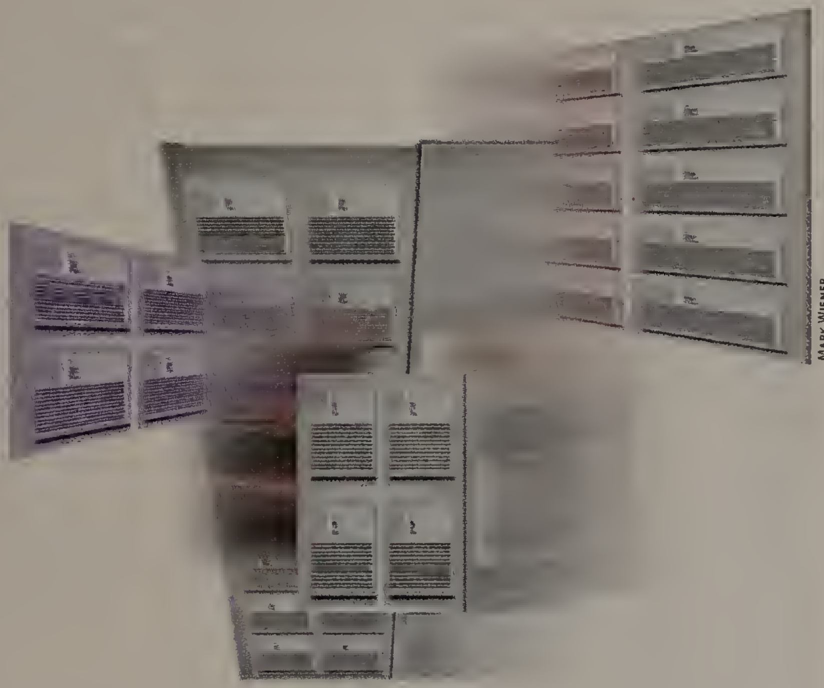
Buyer's Guide to RAID

RAID to Order

You can have it your way: It's open or proprietary. . . . It's fast or fat. . . . It's cheap or expensive. However you like it, RAID's becoming the only way to go. . . .

By Cathleen Gagne

If the word RAID conjures up images of a deadly hornet or cockroach spray as it originally did for me, then you may be in for a pleasant surprise. RAID (redundant arrays of inexpensive disks) is a lot of things to a lot of people, but it doesn't burn your nostrils, damage the ozone layer or kill ants.


MARK WIENER

The RAID storage market is exploding: International Data Corp. (IDC), a market research firm in Framingham, Mass., reports that this area grew 71% from 1994 to 1995. The expansion was fueled by strong open systems and mainframe market performance, according to IDC's "1995 DASD Subsystem Year in Review."

There are plenty of reasons for growth, according to Thomas B. Lahive, an analyst at IDC. They include the following factors:

- Users are tired of losing data.
- Hard disk drive prices have dropped.
- Some RAID is being configured internally.
- Client/server environments are taking a more mission-critical tack.
- There are more RAID alternatives.
- RAID is no longer considered a risky technology.

RAID storage systems come in all varieties; users can be more selective with their purchases and get what they need. *Computerworld* offers a closer look at the mainframe and open systems markets, the players, pricing and projections for the next year or so. Options are plentiful, which makes it an interesting buyer's market. Turn to page 90, and see for yourself.

Inside

This **Buyer's Guide** takes a separate look at the mainframe and open systems RAID markets. It includes vendor roundups, a glossary and resources for users who need more information. See pages 90 and 91

Firing Line profiles Storage Computer's Unix RAID, a unique product that is starting to get some respect from users and experts. See page 94

The **Buyer's Guide Satisfaction Scorecard** shows that users are pleased with their mainframe RAID products. More than 70% of the users interviewed said they would buy their systems again. See page 96

Mainframe RAID

The way to go

Mainframe RAID is steadily gaining a foothold as the storage medium of choice. Users and analysts insist that RAID is the safest way to protect data, and it's also the way everything is going.

"With RAID, you're a lot safer than just running naked," says Stuart Schuman, director of data processing at the Ramada Milford Plaza Hotel in New York. Schuman uses IBM's Ramac.

"We crashed so bad once with the former disk drives that my backups were no good, and we lost a lot of money in business — it was just unbelievable," he says. RAID is critical to the hotel industry, which operates 24 hours a day, seven days a week, he says.

RAID is a category of disk arrays in which two or more drives work together to provide increased performance and various levels of error recovery and fault tolerance. Most RAID units are based on racks of 3½ drives that provide 2G or 4G bytes of capacity each.

Backups

Data can be protected in several ways, depending on which RAID level is used (see RAID levels, page 94).

Some of the levels, such as RAID Level 1 (disk mirroring), are considered expensive because they involve 100% duplication of data, which typically doubles the cost per megabyte.

But this is changing.

A recent report from Meta Group, Inc., a market research firm, predicts dramatic price cuts during the next two years: The price per megabyte for high-performance mainframe RAID is expected to drop from $1.74 today to 43 cents by the end of 1998 (see chart, page 91).

And the market should pass a major threshold this year: All IBM-compatible mainframe disk storage purchases this year will involve RAID devices, according to a recent report by International Data Corp. Terabytes shipped for mainframe RAID increased dramatically last year and will increase this year as more and more companies upgrade their IBM 3380- and 3390-type 10½-in. disk systems to RAID, says Fara Yale, an analyst at Dataquest, Inc. in San Jose, Calif.

"Typically, a site will start with just one subsystem while they try out RAID and continually upgrade other parts of their [direct-access storage device] farms," Yale says. "It's rare you would see a site completely convert all of [its] DASD over to RAID in one fell swoop," she says.

Compared with the multitudes of vendors in the Unix RAID market, mainframe RAID is pretty straightforward.

There is only a handful of providers to watch: IBM, EMC Corp., Storage Technology Corp., Hitachi Data Systems Corp. and Amdahl Corp.

Yale says this will be a relatively quiet year for mainframe RAID vendors, as they "try to get a foothold in the market to expand a revenue base."

"You may see some capacity enhancements late in the year, but even that's not highly likely," she says.

But expect a new round of announcements for the System/390 market next year.

— Cathleen Gagne

Glossary

RAID stands for redundant arrays of inexpensive disks. Some people use the word "independent" in place of "inexpensive." It is a category of disk arrays (two or more drives that work together) that provide increased performance and several levels of error recovery and fault tolerance.

Disk mirroring. The recording of redundant data for fault-tolerant operation. Data is written on two parts of the same disk, on two separate disks in the same system or on two separate computer systems.

Disk striping. A type of disk-array mapping in which consecutive stripes of data are mapped round-robin to consecutive array members. A striped array, or RAID Level 0 array, provides high I/O performance at low cost. But it also offers lower net data reliability than any of its member disks.

Parity bit. An extra bit attached to the byte, character or word that is used to detect errors in transmission.

Cache. A dedicated bank of high-speed memory or a reserved section of regular memory that is used to improve performance. Cache is a very expensive method of increasing RAID performance.

Sources: *Electronic Computer Glossary*, 1995, Alan Freedman; *Newton's Telecom Dictionary*, 1995, Harry Newton; *The RAIDbook: A Source Book for RAID Technology*, second edition, by the RAID Advisory Board.

Amdahl's Spectris *is due early this year*

The players

Here's a snapshot of the top mainframe RAID players and commentary by Carl Greiner, vice president and services director at Meta Group, Inc. in Westport, Conn.

Symmetrix
EMC Corp.

Hopkinton, Mass.

(800) 258-5528

http://www.emc.com

EMC has stepped out and taken leadership from Amdahl, Hitachi and IBM. EMC's simple approach involves putting a lot of cache in front of the array of small disks. This [results in] great performance and uses the simple mirroring technique to provide high availability. Subsequently, [EMC] has come along with RAID-S, which is a RAID 4/5 combination. They've also come out with data migration services, which automatically move data from older devices to the new ones, and you never take the data off-line.

Ramac
IBM

San Jose, Calif.

(800) 426-3333

http://www.ibm.com

IBM has been very, very quiet lately. All it has is a simple RAID 5 product [that doesn't have] a lot of new functions. IBM has been talking about Seastar, which is the box, and Seascape, which is the architecture. Delivery for this product is forecast for late '97 or early '98.

Iceberg
Storage Technology Corp.

Louisville, Colo.

(800) 456-7684

http:/www.stortek.com

StorageTek has a RAID 6-plus product, which compacts and compresses data as it moves in and out. This gives [StorageTek] the ability to compact and compress — at a rate of three times or higher — 100G bytes of storage, which translates to 300G bytes. StorageTek charges you at 300G bytes even though you're only buying 100G bytes. So it's virtual disk, basically.

Spectris
Amdahl Corp.

Sunnyvale, Calif.

(800) 538-8460

http:/www.amdahl.com

Amdahl hasn't shipped Spectris and probably won't until the end of the first or second quarter. Spectris is a RAID 3 implementation. RAID 3 normally is good for big data files when you're [handling] large bulk data. Users normally have many little data sets that come off the database; we're not sure how it'll perform.

7700
Hitachi Data Systems Corp.

Santa Clara, Calif.

(800) 227-1930

http://www.hdshq.com

Hitachi released the 7700. The company is still going through a lot of shakeout, but it's starting to settle down. The 7700 offers good performance and a very scalable server. It will have enterprise capability, which means it will have SCSI capability by 1997. It's the first step. They're late.

The **Unix** Market

Value is the key

Apply the usual keywords — bigger, cheaper, faster — to the coming year in the open systems RAID sector. Users will get more for their money when they buy RAID devices for Unix or PC-based servers.

Oh yes, they also will get two totally new architectures. Users won't get to choose directly between those architectures; their systems vendors will. But users should see performance gains with either one.

"With all these robust applications coming on the marketplace, such as video on demand and all the high-performance systems, these new storage subsystems will be more in tune with the processors. Storage will become less of a hindrance. Most users don't realize that system performance is being degraded by storage," says Thomas B. Lahive, a senior analyst at International Data Corp.

At issue is which next-generation RAID subsystems will be based on the Fiber Channel Arbitrated Loop (FCAL) standard that is offered by the Fiber Channel Loop Committee and which will be based on the copper-based Serial Storage Architecture (SSA).

Many drive makers and computer systems vendors are boosting FCAL, which is expected to debut in RAID systems in the third quarter.

IBM is promoting SSA and already offers the architecture in its 7133 storage subsystem that is used with IBM RS/6000 servers. IBM says it plans to announce other vendors' adoption of SSA and the availability of SSA-based drives and RAID systems for other computing platforms. Both architectures use a loop, or ring, architecture; the key differences are what the systems are based on — SSA on copper wire and FCAL on fiber-optics — and where the intelligence resides in the RAID subsystem.

"With SSA, you can get it now, and the cost is cheaper. Fiber will be out three quarters from now and will cost more," Lahive notes.

But SSA and FCAL will cost about the same in the long term, he says. Both will be faster and easier to implement than today's SCSI technology, he says.

Another analyst emphasizes that SSA and FCAL will concern systems vendors instead of IS managers.

Jim Porter, president at Disk/Trend, Inc. in Mountain View, Calif., says users should care about the capabilities of what they buy, not the underlying architecture.

Lahive says the following are other developments users can watch for in open systems RAID:

- Capacities will double annually, which will cut the cost per megabyte almost in half. Today's standard is a 3½-in. disk that holds 4G bytes of data. That will double to 8G bytes in the third quarter and will double again to 16G bytes a year later.
- More storage management tools. These should include storage optimization capabilities, such as those in Hewlett-Packard Co.'s Autoraid, which allows users to change RAID levels depending on their needs. Also watch for features that support reallocation of cache and carry into open systems some of the hierarchical storage capabilities that are already available in the mainframe environment.
- New generations of processors, such as Intel Corp.'s 133-MHz Pentium and P6 chips and the latest RISC chips, will appear as controllers. That will improve RAID subsystem performance. —*James Connolly*

Data General's Clarion *features extensive connectivity to open systems platforms*

Open up

Here's a sampling of the growing pool of independent Unix RAID suppliers

EMC Corp.
Hopkinton, Mass.
(800) 258-5528
http://www.emc.com

Data General Corp.
Westboro, Mass.
(800) 328-2436
http://www.dg.com

Box Hill Systems Corp.
New York
(800) 727-3863
(212) 989-4455

Andataco
San Diego
(800) 334-9191
http://www.andataco.com

Cambex Corp.
Waltham, Mass.
(800) 292-7472

Storage Dimensions, Inc.
Milpitas, Calif.
(800) 765-7895
http://www.storagedimensions.com

Storage Computer
Nashua, N.H.
(603) 880-3005
http://www.storage.com

Storage Technology Corp.
Louisville, Colo.
(800) 456-7689
http://www.stortek.com

Storage Concepts, Inc.
Irvine, Calif.
(800) 525-9217

Nobody pays retail

The saw "Nobody pays retail" lives on in the RAID market. There is room to negotiate price, whether it's for open systems or mainframes. IDC analyst Thomas Lahive offers the following tips for negotiating the best price for RAID:

- If you're in the lower end of the market (under 100G bytes of capacity), there are so many competing vendors that you can play one off the others. There is less flexibility in the mainframe market because there are fewer suppliers, but there is still room for negotiation.

- If list prices run $1.80 to $3 per megabyte, negotiated street prices may be as low as 90 cents in basic open systems configurations and $1.40 to $1.50 per megabyte for mainframe products that feature high performance and high availability.

- Remember to get it in writing. "Always remember the fact that open systems pricing is about 90 cents per megabyte. If [the vendor is] trying to get more than that, make them show you why they are charging a premium, why they will improve performance by a certain amount, like 20%, and make them put it in writing," Lahive says.

- Make sure that you know what you're buying. You must question vendors about how they're pricing RAID. Ask the vendors whether they're paying for the usable capacity or the total capacity.

Pointers

ORGANIZATIONS

The RAID Advisory Board
13 Marie Lane
St. Peter, Minn.
56082-9423
(507) 931-0967
(507) 931-0976 (fax)
http://www.andataco.com/rab

"Dedicated to promoting the understanding and utilization of RAID and related storage technologies."

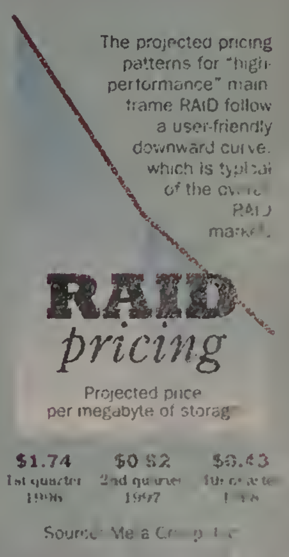
NEWSGROUP

comp.arch.storage

BOOKS

The RAIDbook
A sourcebook
for RAID technology.
RAID Advisory Board,
1995, $29.95 (free to
board members)

The RAIDprimer
A brief introduction
to RAID technology.
RAID Advisory Board,
1995, $4.95 (free to
board members)

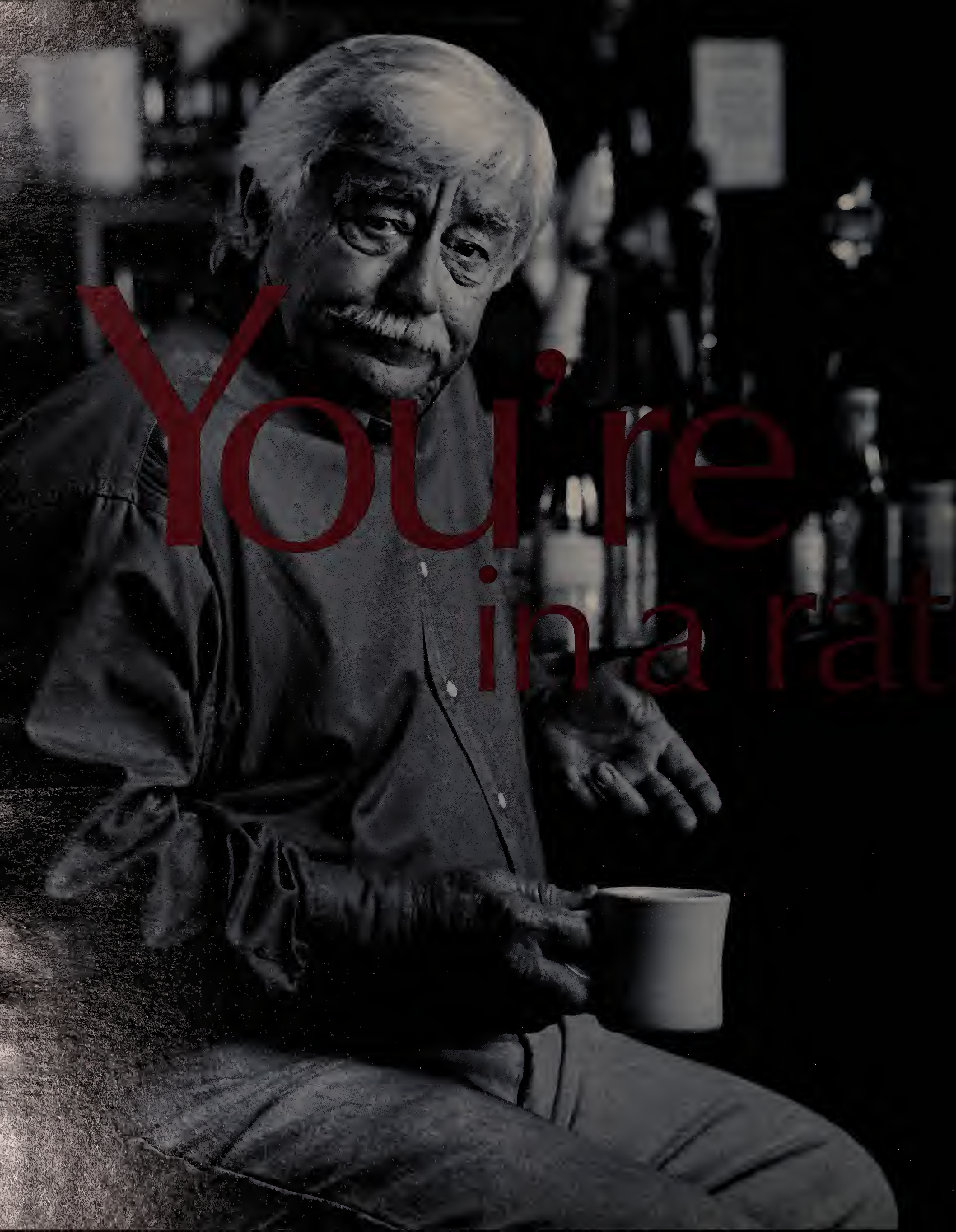


The projected pricing patterns for "high-performance" mainframe RAID follow a user-friendly downward curve, which is typical of the overall RAID market.

RAID *pricing*

Projected price per megabyte of storage

Source: Meta Group Inc.



You're
in a rat

race.

You'd better use the MIPS™ RISC processor to run Windows NT™. It's three times faster than the Pentium™ processor.

Don't come in
last, like
I did.

You see, I was presented a similar opportunity once, over 25 years ago. I was at a party, and I ran into a very animated young man from the Pacific Northwest.

He asked me if I'd like to invest in something new.

He explained how he thought that one day, people everywhere would wear athletic shoes all the time. For all kinds of things. And he showed me some drawings of shoes, with the oddest looking logo I'd ever seen.

"Sounds very interesting," I said, trying not to sound too patronizing. "But new things tend to make me nervous." And with that, I excused myself.

Now unless you've been living on another planet the past twenty years, I don't have to tell you what happened to that man and his idea.

So when my son, the computer whiz, told me NEC's 250 MHz V_R4400™ runs Windows NT up to three times faster than the 100 MHz Pentium processor, I listened.

Then I read that Microsoft actually used the MIPS processor to develop Windows NT. And that lots of Fortune 500 companies are already successfully using it.

And now, looking back, I don't think I would've dismissed that young man so quickly. I'd have asked a few more questions. The same kind of questions you should be asking NEC about that amazingly quick MIPS RISC chip. Just call 1-800-366-9782 and ask for Info Pack #185. Because opportunities like this come around once, maybe twice in a lifetime.

NEC

©1996 NEC Electronics Inc. Microsoft is a registered trademark and Windows NT is a trademark of Microsoft Corporation. Pentium is a trademark of Intel Corporation. V_R4400 is a trademark of NEC Corporation. All other registered marks and trademarks are property of their respective holders.

RAID levels

Here's a basic look at what each of the RAID levels means. It's important to know that RAID 6 isn't necessarily better than RAID 0. The levels indicate the way data is distributed and the way redundant capacity is implemented.

RAID as a concept was first defined in 1987 by engineers at the University of California at Berkeley. These engineers described five levels of RAID configurations (RAID 1-5). RAID 0 and RAID 6 have since been added.

Level 0.
Disk striping without parity information.

Level 1.
Disk mirroring or shadowing. One disk drive and an exact backup.

Level 2.
Disk striping at bit level and parity information.

Level 3.
Disk striping at the byte level and one disk per set for parity information.

Level 4.
Similar to RAID 3, but stripes data in large chunks.

Level 5.
Disk striping in sequential blocks across all disks with parity data.

Level 6.
RAID 5 plus redundant disk controllers, fans, buses and so on.

Source: *Newton's Telecom Dictionary*, 1995, Harry Newton

RAID 7 wins over skeptics

By Kevin Burden

"Our first reaction was, 'RAID 7? This is snake oil, and these guys are charlatans,'" says Dan Austin, network administrator at a systems software company in Santa Clara, Calif. But he soon accepted RAID 7 when he learned of its architectural advantages:

- I/O data paths are asynchronous.
- Device hierarchy and data bus utilization are also asynchronous.
- An embedded process-oriented operating system manages all I/O transfers across drives.

Yes, RAID 7 takes its place next to RAID Levels 0-6 (see explanation of RAID levels at left), and it's recognized by the RAID Advisory Board as a legitimate level.

But RAID 7 isn't entirely new. Storage Computer Corp. in Nashua, N.H., has been shipping RAID 7 Storage Servers since 1992. To date, it is the only company that offers this level.

RAID 7 servers can be concurrently hooked to a variety of Unix and midrange systems. They are available in desktop, rack-mount and console models.

The result is a high-performing open systems architecture that users graded highly for scalability, speed and multiplatform support. But users expected more functionality from its internal software.

This evaluation was completed through in-depth interviews with four RAID 7 users. Each user graded his satisfaction with the storage servers in the following categories:

Evaluators

🟫 **Systems software company**
⬛ **University**
🟩 **Oil and gas company**
🟨 **Telecommunications equipment company**

Grading system

Excellent	**A**
Good	**B**
Fair	**C**
Poor	**D**
Very Poor	**E**

Ease of use

A B A B

You either like it or love it, users say. Those who love it rave about RAID 7's installation utility. "Installation is self-explanatory. I didn't read any manuals and only asked tech support for recommended setting for our environment," Austin says. "It doesn't require system-level drivers either," which allows for a more open server architecture, he says.

Users who like it also say setup is easy, even when connecting to different platforms. But they only gave B's partly because RAID 7 needs to be taken down when users reallocate partitions. This isn't any different from other RAID systems, according to Thomas Lahive, a senior analyst at International Data Corp.

But because RAID 7 runs configuration software within itself, "I expect it to be able to make these changes on the fly," says Michael Frederick, senior systems analyst at the University of Houston.

RAID 7 also requires users to reclaim freed-up space when partitions are moved. "It doesn't automatically do so. That space is in limbo if you don't do it yourself," Austin says.

Performance

A A+ A A

Every user interviewed was ecstatic about RAID 7's performance, partly because it blows away the older direct-access storage device (DASD) systems they had used. But mostly the users were ecstatic because RAID 7 has architectural characteristics that make it scream. RAID 7 compliance means each drive and interface has independent data paths that are connected to a high-speed data bus. This allows independent transfers to and from the central cache, which gives RAID 7 exceptional performance. "Our Pentium server is now streaming data at rates we never expected to see under Banyan Vines," Austin says.

Frederick, who boots his Windows NT servers directly off the RAID 7 box, says it does so with incredible speed. "Our NT server with a good SCSI disc system took between three and four minutes to boot. Now it takes only 45 seconds."

Scalability

B+ B A A

The console models use up to 48 drives for a total capacity of 420G bytes. Expansion options top the line at 1.3T bytes, which users feel is a very comfortable ceiling.

Scalability is very good in one way and restrictive in another, Frederick says. "You can plug any vendor's SCSI drive into RAID 7. In that way, it scales easily and fast," he says. The line supports 3½- and 5¼-in. disks of any capacity from various manufacturers. But RAID 7 will default to the smallest drive's capacity if drives are mixed.

It's restrictive "because it uses many proprietary products [such as] disk and host adapters and custom boards that lock you to Storage Computer," Frederick says. None of the evaluators disclosed availability problems; Frederick's concern is the high cost history of proprietary products.

Support and maintenance

B B- A C

Evaluations are mixed regarding support. RAID 7 is easy to maintain, which is why the support category fared as well as it did. "It's like supporting a toaster oven — there's nothing to it," Austin says. But Storage Computer's technical support is why grades weren't higher.

Maintaining RAID 7 systems with in-house staffers is much easier than supporting older DASD units, according to a user from an oil and gas company. "If a disk failed in my other units, I would have to take the server down then unplug all the SCSI drives to remove the bad one from the chain," he says. Nothing comes off-line when a RAID 7 disk fails. "I pull the failed disk out, plug a new disk in, and its software configures and rebuilds it." It can even be set up so it configures the replaced disk after-hours so there is no chance end users will be disrupted.

Storage Computer will need to strengthen its own support staff if it wants to truly comfort its users. "Their technicians weren't quite up to speed when we first installed it, but they've gotten a little better," Austin says. Channeling questions through distributors isn't the solution either. "I've never been able to contact their support team. I started to really scream through my distributor, who says they have the same problem getting through to [Storage Computer]," Frederick says.

Evaluators say they have had success contacting Storage Computer through its bulletin board.

Value

B B B B

RAID 7's cost figures to be almost $1 per megabyte for the four evaluators. Expensive? Yes, say three of the four users. But once they factored its cost against its advantages, price was overlooked. "It went from being expensive to being nothing when we looked at what it would do for us," Austin says. "I expected IS management to be happy, but even users and senior business management have noticed the improved [application] performance. Everyone is a little more productive and happier," he says. ■

Storage Computer responds

Repartitioning on the fly

Repartitioning while the server is up requires enhancements to the array management software. (Storage Computer didn't indicate any plans to make this improvement.)

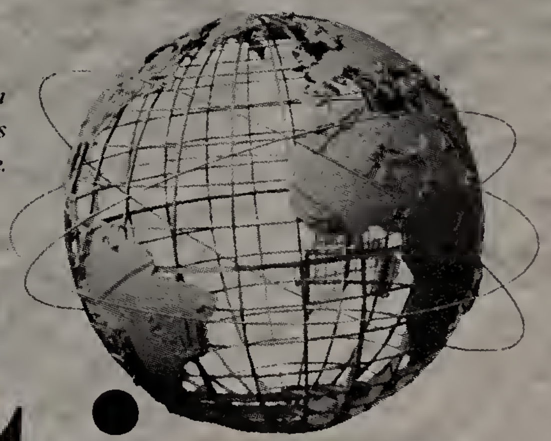
Technical support

We have more than doubled our support staff in the last quarter. We also increased the involvement of our systems integration group in customer-support activities.

As *your* *enterprise-wide* NETWORK *grows,* *So can its* capabilities.

Run communications applications that expand your productivity while they increase profitability.

Modular system architecture lets you expand your communications capabilities now and in the future.



The DEFINITY LAN Gateway provides enterprise-wide Ethernet functionality that's built in, not bolted on.

THE DEFINITY® COMMUNICATIONS SYSTEM.

Multimedia is the future of communications. And the convergence of voice, video and data on fast, high-bandwidth networks is how it will be achieved. But you have to make decisions right now on implementing the multimedia applications you'll need in the future, knowing that if you run those applications on disparate networks and through multiple switches, your costs could go through the roof. What's the answer?

It's our DEFINITY® Communications System. Not only will it optimize your existing investment as well as provide support for future ATM applications, the DEFINITY System also delivers TCP/IP functionality through the DEFINITY LAN Gateway, an integral LAN board that gives you direct Ethernet connections, positioning you today for that future.

With SNMP support for simplified management, the DEFINITY System fulfills all the promise of CTI because it will allow you to manage all your resources across your network. So why take chances with multimedia application implementation?

The DEFINITY System G3V4 gives you enterprise-wide capabilities both today and tomorrow as well as the AT&T quality and commitment to our customers. No matter how big they grow.

For more information on the DEFINITY System G3V4 call 1 800 325-7466, ext. 709.

AT&T. Where innovation leads.

AT&T

[illegible] AT&T

RAID Stacks up

COMPUTERWORLD
BUYER'S SATISFACTION SCORECARD

The varied approaches of Ramac, Symmetrix and Iceberg score well with diverse users

By Kevin Burden

Mainframe RAID buyers aren't overwhelmed with choices — there are three major vendors and a handful of others trying to break in to the market. But buyers are finding the right match for their needs.

EMC Corp.'s Symmetrix line is known for its stellar performance — and its high price. Users choose IBM's Ramac for its RAID Level 5 implementation, which provides a comfortable mix of reliability, performance and value. And Storage Technology Corp.'s Iceberg is noted for its extreme fault tolerance.

Luckily, no matter what your priorities are, it's tough to make a bad choice. More than 70% of all users interviewed said they would buy the same systems again. *Computerworld* contracted First Market Research in Austin, Texas, to survey at least 40 users of each vendor's system. The goal was to determine what prompted users to choose their system and how well it performed overall.

Symmetrix

Before EMC introduced RAID-S to its Symmetrix line, the products used RAID 1 mirroring technology, which delivers the highest performance of any RAID level, says Thomas Lahive, a senior analyst at International Data Corp. RAID-S is a RAID Level 4/5 implementation for mainframes and open systems.

RAID 1 replicates all data at least once on a separate disk. Its performance advantage comes from writing data in its entirety to a disk instead of striping it across multiple disks. Twenty of the 46 EMC users interviewed said "speed" was the top reason they chose Symmetrix, nearly twice as many as Ramac or Iceberg users. And 16 of the 20 awarded speed A's; the rest gave B's.

Interest in reliability rides shotgun to speed rather than taking a back seat. Fourteen out of 19 users who cited reliability as an important feature gave it the highest grade they could.

Price is Symmetrix's downfall. "RAID 1 is very expensive because of the volume required to duplicate everything," Lahive says. How much more expensive? "[Ten percent] to 15% premiums over RAID 5 systems," says Richard Blaschke, vice president of mainframe marketing at EMC. But EMC loves to negotiate. Eighteen out of 19 users gave A's or B's to the price they worked out.

Iceberg

Iceberg users want the highest data reliability and fault tolerance possible and are less concerned with speed. Iceberg is RAID Level 6, which means all data is updated to two parity schemes instead of one, like the RAID 5 implementation in Ramac.

Two disks can take hits in a dual-parity system without losing data, which makes RAID 6 the most fault tolerant of the RAID levels.

"Data integrity is our No. 1 concern. Iceberg's reliability has lived up to and beyond its reputation," says Joe Dawson, director of information systems product services at Minnesota Mutual Life Insurance Co. in St. Paul.

Writing to dual-parity blocks hurts Iceberg's speed, although several users acknowledge that they are willing to trade performance for improved fault tolerance. When asked what was more important, 71% of Iceberg users said fault tolerance was most critical; only 29% cited speed.

Iceberg gained fans for potential capacity. StorageTek had more users (eight) who said overall capacity played a significant role in their decision than IBM (three) or EMC (three). Part of the reason points to StorageTek's Virtual Storage Architecture, Lahive says. A virtual direct access storage device (DASD) eliminates the space gaps that conventional DASD puts between data for the read/write mechanism to work. More data is stored per gigabyte.

Ramac

Ramac users hold reliability in the same high regard as StorageTek users, but they are less willing to sacrifice speed to get it. Like Iceberg users, 40% of Ramac users said reliability was their deciding factor. But unlike Iceberg, which received favorable grades from the full 40%, Ramac had three users who gave it a C.

Speed is Ramac's second most alluring trait. Users said they were impressed by its speed but were more impressed that it performed up to IBM's promises. Overall, nearly three quarters of the users said Ramac lived up to IBM's presale promises; 10% said it exceeded them.

Price, however, had little effect on purchase decisions. Ramac garnered the smallest number of users (12) who said negotiated price influenced their decision, and five considered the price only average. ■

Burden is *Computerworld*'s senior researcher, Firing Line/Scorecard.

Overall satisfaction

Percentage of users who gave grades	A Very good	B Good	C Average
Symmetrix	65%	24%	4%
Iceberg	61%	24%	10%
Ramac	56%	34%	10%

Some users didn't offer an opinion. None gave "poor" grades.

Reliability counts

Users have different priorities, but they all rank reliability first or second

Symmetrix
EMC Corp.
Hopkinton, Mass.
(800) 258-5528
http://www.emc.com
(46 users surveyed)

USER PRIORITIES
In order of importance

1. Performance/Speed
2. Reliability
3. Price negotiated

Iceberg
Storage Technology Corp.
Louisville, Colo.
(800) 456-7689
http://www.stortek.com
(41 users surveyed)

USER PRIORITIES
In order of importance

1. Reliability
2. Price negotiated
3. Performance/Speed

Ramac
IBM
San Jose, Calif.
(800) 426-3333
http://www.ibm.com
(50 users surveyed)

USER PRIORITIES
In order of importance

1. Reliability
2. Performance/Speed
3. Price negotiated

Snippets

A sampling of comments from users:

Symmetrix

Jim Flock, vice president of operations, Home Box Office, Inc., New York
"Symmetrix calls EMC before we know there is a problem, but it should also notify the user."

Deidrich Towne Jr., technical analyst, Niagara Mohawk Power Corp., Syracuse, N.Y.
"EMC tripled the results of the other vendors in our own performance tests."

Ramac

Stuart Schuman, data processing director, Ramada Milford Plaza Hotel, New York
"We would like Ramac to get closer to fault-tolerant processing."

Dennis Johnson, systems engineer, St. Vincents Medical Infirmary, Little Rock, Ark.
"Ramac delivered the best value when we priced it against EMC."

James Hanna, centralized computer services supervisor, Nebraska Public Power District, Columbus, Neb.
"Ramac's controller it inherited from the 3990 DASD is getting dated."

Iceberg

Mary Carpenter, assistant vice president, Wells Fargo Bank, Concord, Calif.
"Iceberg was difficult to install, but it works the way it's supposed to."

FIVE GREAT REASONS TO TRY THREE GREAT PRODUCTS.

1

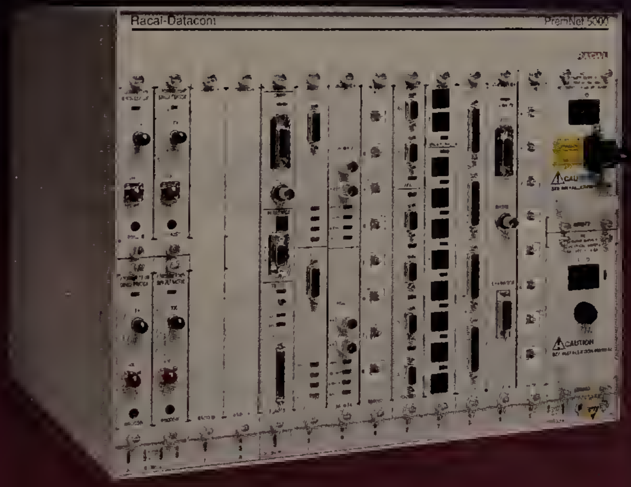
MIGRATING FROM ANALOG TO DIGITAL

EXCALIBUR® DAPs

Excalibur Digital Access Products and DSUs come to you from the industry leader—Racal-Datacom. Whether your needs are fundamental business networking or high capacity mission-critical applications, Racal has a solution that works for you today, at your pace and prepares you for the evolution to frame relay when you're ready.

2

TRANSPORTING DATA, VOICE, ATM AND VIDEO OVER FIBER



PREMNET®

Finally, a high speed solution for transporting multiple data, ATM, voice and video traffic safely and efficiently. With the PremNet fiber backbone from Racal, you can transparently send data in virtually any format at native speeds without the need to create separate networks for each application type.

3

BUILDING BANDWIDTH TO 1.544 Mbps ACROSS YOUR WAN

ISX 5300

The ISX 5300 is the digital access multiplexer of choice for building bandwidth across your wide area network. Designed to grow with your business, the ISX 5300 effortlessly supports migration to frame relay, fractional T-1, T-1 and ATM when you're ready.

4 REASON NUMBER FOUR

More than ever, your business depends on your network. For that reason, shouldn't you depend on a company that understands the importance of network communications? Since 1955 Racal-Datacom has helped the world's business and government organizations migrate mission-critical applications to new technologies and services. That's why all Racal products are supported by the company's strength in network management and expertise in managed migration services including network design, implementation, worldwide maintenance and support.

You can use any or all of these reasons to give us a call. Ask about our special promotions on Excalibur, PremNet and ISX 5300 products. For a limited time, we're offering *free network management software, free installation with your maintenance purchase and free design services on select products.**

When it comes to managed migration, Racal has a solution. That's reason enough to call us today! **1-800-RACAL-55. Or visit us on the Internet at the Racal-Datacom Home Page, http://www.racal.com**

5 REASON NUMBER FIVE

WIN A DREAM VACATION FOR FOUR TO FLORIDA!

- **Mail in the reader service card.**
- **Call 1-800-RACAL-55**
- **Or visit us on the Internet at our Home Page, http://www.racal.com**

WIN • A
DREAM VACATION
FOR • FOUR • TO
FLORIDA
RACAL CELEBRATION SWEEPSTAKES
DISNEY-MGM STUDIOS™ THEME PARK
EPCOT® CENTER • MAGIC KINGDOM® PARK
SEA WORLD® • UNIVERSAL STUDIOS FLORIDA

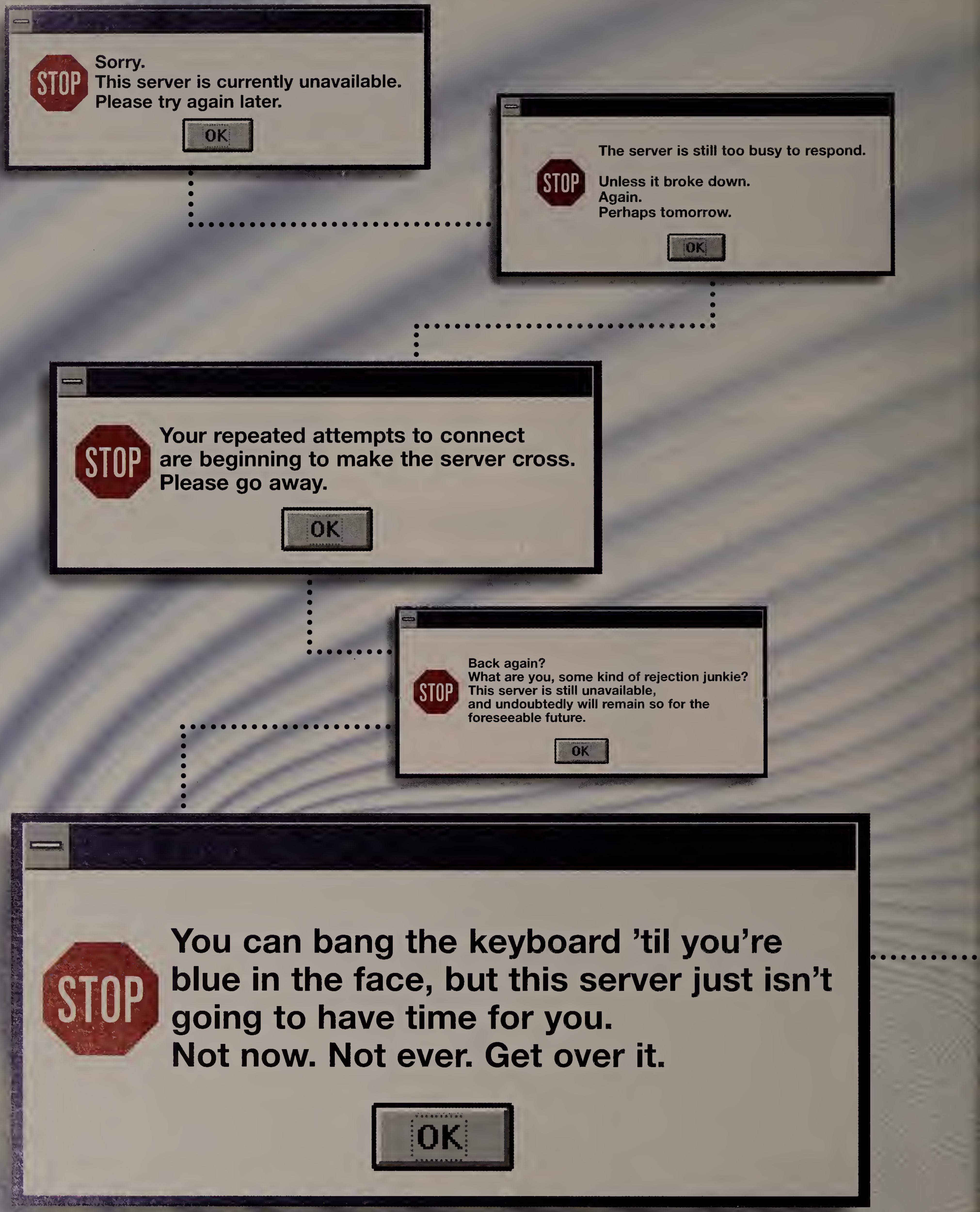
That's all it takes to become eligible to win a dream vacation to Florida! Imagine 5 days and 4 nights at the beautiful Holiday Villas Hotel, centrally located near Orlando's most exciting attractions. Prize includes round-trip airfare for four (4), four days free rental car, tickets for four to Sea World®, Universal Studios Florida® and Walt Disney World® Resort (with admission to Magic Kingdom® Park, Epcot® Center, or Disney-MGM Studios™ Theme Park). And $500.00 spending money to make your dream come true! Contact Racal today to find out more about our three great products and you could be a winner!

*Offers are subject to change without notification. Racal-Datacom is a registered trademark of Racal Electronics Plc. Excalibur and PremNet are registered trademarks of Racal-Datacom, Inc. WALT DISNEY WORLD Resort, MAGIC KINGDOM Park and EPCOT Center are registered trademarks and Disney-MGM Studios Theme Park is a trademark of the Walt Disney Company. Sea World is a registered trademark of Sea World Inc. Universal Studios Florida is a registered trademark of Universal City Studios, Inc.

© [illegible] Racal-Datacom, Inc. All rights reserved.

RACAL

Communicating through technology



Sorry.
This server is currently unavailable.
Please try again later.

The server is still too busy to respond.

Unless it broke down.
Again.
Perhaps tomorrow.

Your repeated attempts to connect
are beginning to make the server cross.
Please go away.

Back again?
What are you, some kind of rejection junkie?
This server is still unavailable,
and undoubtedly will remain so for the
foreseeable future.

You can bang the keyboard 'til you're
blue in the face, but this server just isn't
going to have time for you.
Not now. Not ever. Get over it.

OBVIOUSLY, THIS WEB SITE ISN'T RUNNING ON AN ALPHASERVER.

If the purpose of your Internet site is to annoy as many people as possible, most any server will do. However, if you'd like to offer access instead of agita, try running on an Internet AlphaServer™ system. The 64-bit speed of Alpha makes other servers look like sluggish@sloth.slo. So your site handles huge volumes of visitors, instead of turning them away. Reliability is standard equipment. So is a three-year warranty. Translation: your site stays open for business, not down for maintenance. You also get superb scalability, for future expansion. A full suite of Internet software, with powerful administration tools. A wide choice of preconfigured models. And something no other 64-bit RISC server offers: Windows NT™ or UNIX,® whichever you prefer. So you can focus on running your business, not wrestling with bits and bytes. To see the Internet AlphaServer systems in action, visit http://www.digital.com/info/internet, contact your Digital Business Partner or call 1-800-DIGITAL, press 4. And build an Internet site they'll find way cool. Instead of one they can't find at all.

The Internet AlphaServer 1000—one of a family of high-performance Internet servers, preconfigured and ready to run.

digital™

WHATEVER IT TAKES℠

ABR

©1995 Digital Equipment Corporation. Digital, the DIGITAL logo and AlphaServer are trademarks and Whatever It Takes is a service mark of Digital Equipment Corp. Windows NT is a trademark of Microsoft Corp. UNIX is a registered trademark in the United States and other countries, licensed exclusively through X/Open Company, Ltd.

Look Out, Here Comes

Cost is just one reason U.S. companies are looking to the subcontinent for software development. Jaikumar Vijayan, *Computerworld's senior writer for PC hardware, spent some time in-country talking to the people who are putting India on the world's software map.*

At 23, Ashok Shantha Narendra Kumar is on the fast track. A recent computer science graduate from one of the best schools in India, Naren, as he's known, is a hotshot programmer at Bangalore-based Infosys Technologies Ltd., one of the most respected contract programming firms in the country. He hasn't been to the U.S. yet, but will likely visit soon.

Programmers like Naren, twentysomething and ambitious, are hotter than Indian curry in a market that can't seem to churn them out fast enough. Starting salaries average 150,000 rupees a year. High by Indian standards, that's less than $4,500 a year, or about one-tenth of what a comparable U.S. programmer makes.

For that reason, Naren represents the competition — some would say unfair competition — for people such as Julie Cairns-Rubin of Somerset, N.J. A former analyst in the information systems unit at SeaLand Service, Inc. in Edison, N.J., Cairns-Rubin is one of nearly 100 SeaLand IS employees whose jobs were transferred overseas last year to be performed by low-cost foreign programmers from offshore firms in the Philippines and India.

After years of working in a largely mainframe Cobol environment at SeaLand, Cairns-Rubin is retraining in client/server application development. She has a bachelor's degree in business, a minor in data processing, 11 years of experience at SeaLand and no job. She is seething.

"Corporations are saying they need to do this because this country doesn't have the same skills and experience that [foreign programmers] have," Cairns-Rubin says. "But that's a real phony excuse. Corporations are doing this because they are getting a lot of cheap labor, that's all. Greed is what is driving this whole thing."

The new global economics

Cairns-Rubin is just the tip of the iceberg, a casualty of the new global economics of the Information Age.

A growing number of large corporate end users — including AT&T Corp., Citicorp, General Electric Co., Caterpillar, Inc. and Reebok International Ltd. — are tapping software developers in India and elsewhere, often for 40% to 60% less than the cost of U.S. developers. Exact figures on the amount of programming work being outsourced to contract programmers overseas are hard to come by, but experts such as Howard Rubin of Rubin Systems, Inc. agree it recently has increased dramatically. Rubin Systems, an information technology consulting firm in Pound Ridge, N.Y., conducted a survey of the IT industry in India as part of a worldwide benchmark project.

Typically, experienced Indian programmers make anywhere from a few thousand dollars per year to about $10,000 per year. Their counterparts in the U.S. make between $36,000 and $48,000 a year, according to *Computerworld*'s 1995 salary survey. Wage rates for programmers in Ireland, Russia, the Philippines, Israel, Brazil and elsewhere are also lower than they are in the U.S. (see "Offshore options" on page 104).

"The phenomenon is being driven by the typical drivers: economics and competitiveness," says Jeff Kaplan, an analyst at Meta Group, Inc., a research and consulting firm in Boston. "More and more [U.S.] companies are seeking to out-task as many specific [lower level] functions as they can in order to retain as many strategic functions as they can."

While still a relatively small market at around $500 million a year, India's software export business is mushrooming — it grew by 115% in 1993 and 61% in 1994, according to the National Association of Software and Service Companies (Nasscom), India's quasi-governmental software industry promotion organization.

And in a survey of Indian IT companies, fully 42% expect India's worldwide market share to grow to two to six times its current size in the next three to five years, according to Rubin Systems.

As compelling as the cost savings are, there are other factors fueling the growth in India's software

Meet Naren, hotshot Indian programmer

Ashok Shantha Narendra Kumar, or Naren, as his friends call him, is a 23-year-old programmer working in Bangalore for Infosys Technologies Ltd., one of India's largest software firms. He's pictured here in front of Vidhana Soudha, the state's imposing legislative assembly building.

Western-style informality and openness is infiltrating the stiff, hierarchical management styles that traditionally distanced upper management from frontline staff in Indian companies. Here, Naren shoots the breeze with Infosys' managing director N. R. Narayana Murthy. "The flexibility given to us is unique to this [business]," Naren says.

Naren may be employed by Infosys in Bangalore, but he works for a U.S. company. He is part of a 70-person team involved in a long-term project for a major U.S. corporation. Satellite communications and dedicated links allow Naren to log on directly to the client's computers in the U.S. "The team here is a virtual extension of the U.S. customer," Naren says.

All photographs by Raghu Rai/Magnum Photos

India

First in a two-part series

industry. India's relative abundance of labor and its rapidly improving communications infrastructure are two important factors. Maturing project management skills and the fairly reliable quality of its programmers also add impetus to the shift of IT business overseas.

And no longer is it just low-level Cobol programming jobs that are crossing the ocean. Increasingly, more of the sexy, high-end stuff like client/server applications, multimedia, object-oriented programming and networking jobs are being exported, observers say. Leading this migration of upstream technology work to India are companies such as Infosys, Wipro Infotech Group, Tata Information Systems Ltd. (TISL), Satyam Computer Services Ltd. and Tata Unisys Ltd. (TUL).

"If somebody can achieve the same quality at a lower cost, why wouldn't everybody beat a path toward their door?" asks Yogendra Singh, vice president of software development at TISL.

Of course, offshore contract programming has its downside. Problems with languages, accents, work culture and the sheer geographic distance add layers of complexity to long-distance relationships.

"The amount of project management that is required and the communication costs often put a dent into savings," says Tim Bourgeois, an analyst at International Data Corp. in Framingham, Mass.

Still, for many U.S. and European companies, the benefits exceed the costs, and the relationships work reasonably well.

Come for cost, stay for quality

Despite the growth in exports, Indian contract programming firms are quick to claim that they are not displacing IT workers in the U.S.

"Every country competes on its competitive advantage," says N. R. Narayana Murthy, chairman and managing director at Infosys. "Today, we provide a cost advantage of anywhere [from] 40% to 50% to our American clients. But the real motivation is our ability to mobilize large teams and to provide quality software at [low cost]."

Naren, for instance, is part of a 70-person team handling three separate projects for a U.S.-based multinational corporation. Right now, he and eight others are developing and testing a client/server product based on Unix, C, C++ Motif and X Window System. As part of the project updating process, they keep in touch almost constantly with their U.S. colleagues via electronic mail, telephone and video hookups.

"[The team here] is a virtual extension of the U.S. customer," Naren says. "Although there is a geo-

India, *page 102*

Pursued and pampered, programmers like Naren and his friends are hot commodities in India. Demand for their skills is increasingly dramatically, and employers are pulling out all the stops to lure and retain the best. Apart from an annual salary of about 150,000 rupees ($4,500), Naren's perks include a stock option plan, low-interest loans, subsidized meals and the potential for overseas travel. The Infosys campus includes a gym and basketball and volleyball courts.

Naren takes a break in the Infosys canteen. There are times, he says, when he and his colleagues work around the clock for two, even three, days at a stretch. For those marathon projects, Infosys provides Naren and his fellow programmers dormitories so they can sleep in the building.

Old traditions coexist with the new in Naren's family. Although he can afford to rent his own place, Naren prefers to live with his family in a rambling old mansion in Bangalore. Until recently, a career in the Indian Administrative Services (IAS) was the ticket to stability and social status. Today, it is a career in computers. "In the past," Naren says, "joining the IAS or becoming a doctor was considered prestigious. Now, it is the turn of software."

Illustrations by Mike Reagan

Here Comes India

CONTINUED FROM PAGE 101

graphic separation, there is a conscious effort to have the teams in the U.S. and here work in tandem."

If needed, Naren can switch to an entirely different project, requiring different skills, at very short notice. Before he was assigned to the current project, he was part of a 21-member team developing a warehouse management product on C, Unix and Oracle platforms on a Hewlett-Packard Co. HP 9000 system.

Satellite links, dedicated telephone lines, E-mail, the Internet and videoconferencing hookups give offshore programmers the same kind of access to their customer's hardware as U.S.-based employees. This means that, apart from having a handful of programmers at the customer's site, most of the development work can be done just as easily overseas.

All this communication does not come cheap. Each 64K bit/sec. link has an average annual cost of between $130,000 and $140,000. By comparison, domestic leased lines cost about $9,600 a year. Even though these costs — like most other communications and travel costs — are fully loaded into overall project costs, U.S. companies still find it is often less expensive to outsource to offshore firms.

"It's clear that the savings are significant when you look at the fact that these companies are seeking out and entrusting programming responsibilities to organizations that are halfway around the globe," the Meta Group's Kaplan says.

Infosys typifies the effort and money many Indian companies are putting into wooing foreign business. During the past decade, the company has grown from a start-up operating out of a garage to a 1,000-person, $12 million organization, with a 125,000-sq.-ft. facility in Bangalore's Electronics City, an export processing zone set up, with government help, on the outskirts of town. Starting with typical maintenance services, porting and patching jobs, the company has moved into high-end, specialized applications for vertical markets such as banking, finance, insurance, transportation, distribution and retailing.

Infosys is ISO-9000 quality certified, which means it has been assessed and found to be in compliance with international quality standards, which are used extensively in Europe.

India's Nasscom estimates there are about 95 ISO-9000-certified software companies in India today and 18 companies that have achieved at least a Level 2 in the Software Engineering Institute's (SEI) maturity rating. The highest rating is Level 5. (The SEI rating is a rigorous, U.S. quality standard developed in the 1980s to standardize the software development process.)

Moving upstream

Make no mistake, it's no longer only the low-end legacy system jobs that are migrating to such countries as India. Work involving relational databases, C++, computer-aided software engineering tools, object-oriented programming, multimedia, networking and some niche market applications are starting to go over the satellite to India. In some cases, U.S. companies are shipping all their development work overseas.

There is a good reason for this migration. Labor is cheap and plentiful. Also, more Indian software companies claim to use rapid application development, object-oriented programming, object-oriented development and project management tool sets than do

India, *page 104*

Seven by Twenty-Four

In addition to cost and quality, Indian companies are leveraging other advantages, too. One is the 10½-hour time difference between India and the U.S., which allows them to run cost-effective, seven-day-a-week, 24-hour operations.

Consider Satyam Computer Services Ltd., a software export house based in Secunderabad, about 700 kilometers from Bangalore. Every day between the hours of 4:30 p.m. and 7:30 a.m. CST, Satyam provides first-level maintenance and help-desk services for users at Caterpillar, Inc. in Peoria, Ill., more than 7,000 miles and 10 time zones away.

To get help, a user dials an independent service provider in Vienna, Va., which routes the call via Satyam hot lines to Secunderabad. There, engineers dedicated to the Caterpillar project handle technical and business-related problems. Satyam has been constantly tweaking the process with the objective of keeping communication, language and other issues transparent to the end user, according to Rusi Brij, vice president of international marketing at Satyam.

Elaborate backup measures ensure that calls go through quickly. If the hot lines between the U.S. and Satyam's Secunderabad offices are busy or down, the call is rerouted to reach the Indian site.

Problems are resolved over the phone or by logging on to a user's computer from Secunderabad. Every keystroke in that faraway city screams through a LAN, a gateway and a multiplexer to a government-owned satellite earth station about six kilometers away. A communication satellite picks up the signal and beams it down to an earth station in Amsterdam. From there it is blasted along fiber-optic cables under the Atlantic Ocean to Satyam's office in Iselin, N.J. A local circuit carries it to Vienna and on to Caterpillar's facility.

The guaranteed response time for all calls is 20 minutes, and the average time to fix a problem ranges from 90 to 120 minutes.

—Jaikumar Vijayan

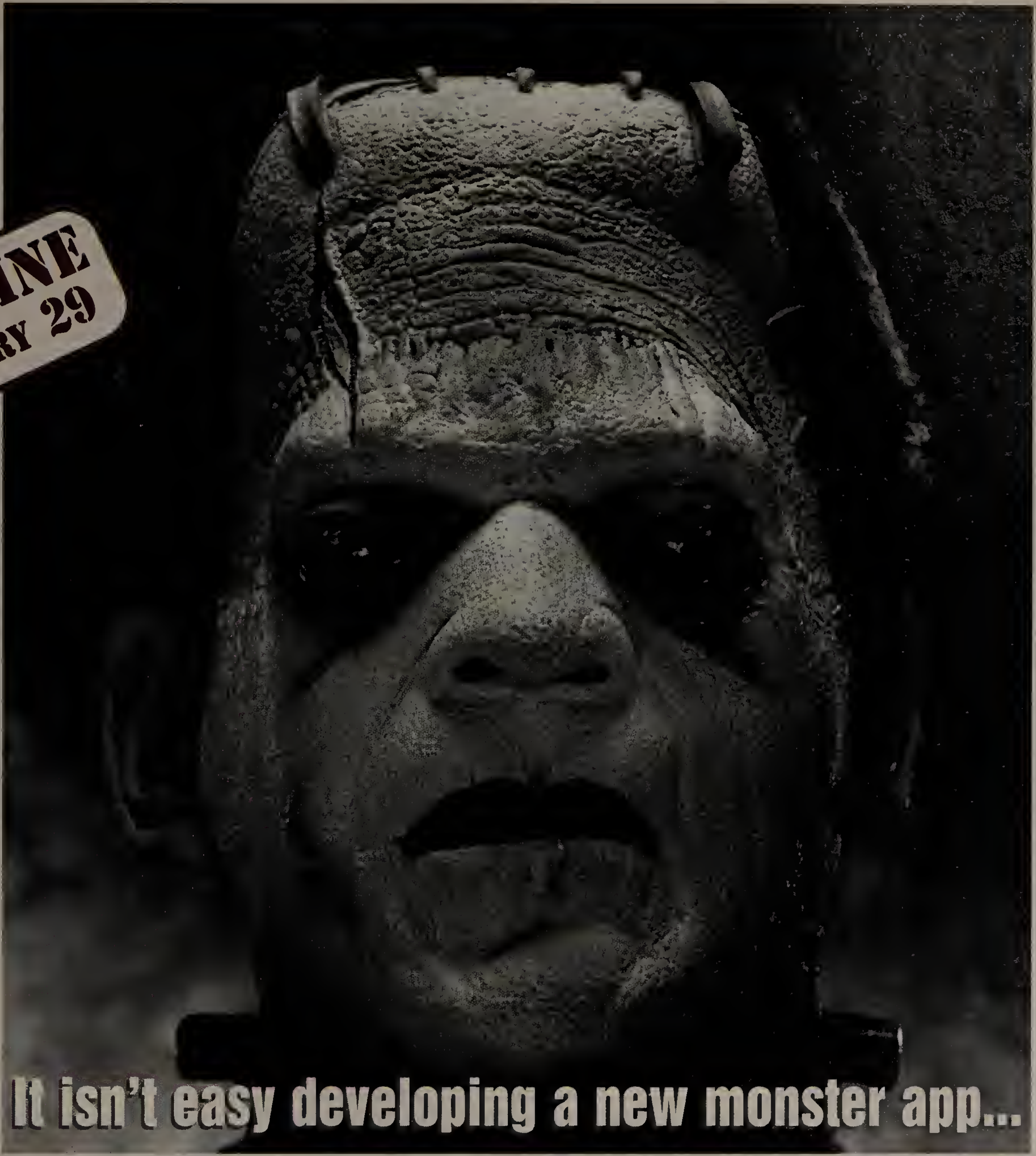
Courtesy of Satyam Computer Services Ltd.

Satyam's facility in Secunderabad, India, can link directly to Caterpillar's IS department in Peoria, Ill.

Glass and concrete. Far from the sweatshops of popular perception, several of India's software factories boast large campuses and modern facilities. The main building at the Infosys campus has an office area of 125,000 square feet. More than 100 phone lines, 700 PCs, 13 servers, an assortment of midrange systems, two dedicated phone lines to the U.S., two dedicated fax lines and two 64K bit/sec. satellite links connect the facility to the outside world.

Chasing software dreams in India's Silicon Valley. Far from his native Jamshedpur — India's northeastern steel city — Naren is part of a rapidly growing workforce of young software professionals flocking to Bangalore, India's computer capital. Bangalore is home to some of the country's largest domestic computer companies and international corporations, including IBM, Digital Equipment Corp. and Hewlett-Packard Co. "There are enormous opportunities for computer professionals in this city," Naren says.

DEADLINE
FEBRUARY 29


It isn't easy developing a new monster app...

But, it can be very rewarding.

If you're a corporate or technical developer, it's time you were rewarded for your "monstrous" efforts in Windows Application Development. Enter today and electrify the judges with your phenomenal Microsoft Windows custom application. Display your ingenuity for breathing life into an application that's streamlining the way your corporation or customers do business. You'll participate in a spine-tingling awards ceremony and reception featuring industry luminaries. Then, you can go back and start digging up some new ideas to bring to life at next year's WINDOWS WORLD Open! ***Hurry. The entry deadline is February 29, 1996.*** Call 1-800-829-4143 now for your WINDOWS WORLD Open Entry Kit...or, go on-line and download your kit at http://www.wwopen.com

COMPUTERWORLD'S CUSTOM APPLICATION CONTEST
WINDOWS WORLD™
Open
at

WINDOWS WORLD • June 3 – 6, 1996 • McCormick Place • Chicago, Illinois

Founding Sponsors COMPUTERWORLD Microsoft® SOFTBANK COMDEX® Sponsors WALL FORTUNE

[illegible] WINDOWS WORLD [illegible] Chicago [illegible] 1996. The WINDOWS WORLD Open Entry Kit [illegible] the details and rules for this contest. [illegible] where prohibited by law. No purchase necessary. Computerworld, Inc. is an IDG company. [illegible]
WINDOWS WORLD and the Windows logo are used by SOFTBANK COMDEX under license from Microsoft. All other trademarks are the property of their respective owners. ©1996 SOFTBANK COMDEX Inc. • 300 First Avenue, Needham, MA [illegible]

Here Comes India

CONTINUED FROM PAGE 102

companies in the U.S. or the U.K., according to a worldwide benchmark project conducted by Rubin and Ed Yourdon of Rubin Systems. For example, while 77% of Indian companies surveyed used project management tool sets, only 42% of firms in the U.S. and 54% in the U.K. did.

Consider the following examples of high-end development migration:

- Connectware Corp. is a Richardson,Texas-based subsidiary of AMP, Inc., which manufactures a range of mobile communications software. In addition to outsourcing several of its IT functions, the company shipped the entire development of a new integrated telephony product to Perfect Solutions, Inc., a contract programmer in India.
- Wipro, a $525 million computer firm in Bangalore, offers a variety of programming services that run the gamut from hardware design and ASICs to networking, communications and operating system support. Among other things, the company has carved out a market for itself by exactly replicating the development labs of its major clients, including AT&T, IBM, Intel Corp., UB Networks, Inc., Novell, Inc., SunSoft, Inc. and Tandem Computers, Inc.
- TISL, a joint venture between IBM and the Tata Group Ltd., one of India's largest business conglomerates, started by doing low-level coding work for IBM labs worldwide. It has since graduated to object-oriented programming, client/server computing, large multimedia applications and full-fledged product development for IBM and its customers. For example, the Bangalore-based company has developed an RS/6000-based application called TIPS (Total Information Planning System) for facilities management that IBM is marketing worldwide.
- Netquest, a young Bangalore-based start-up founded by Pradeep Singh, a former Microsoft Corp. employee, exports global on-line support via CompuServe user forums for one of the world's largest software companies. In less than two years, Netquest has grown from a two-person shop to an organization that employs more than 100 people. Singh has plans to expand to the Internet before the end of this year.

Such growth in quality, high-end software services offered by countries such as India inevitably will have an effect on U.S. programmers, observers say. Programmers like Naren and companies like Infosys are becoming part and parcel of an international software landscape where borders and boundaries are rendered meaningless by newer and faster communication technologies.

"In the long term, it has to be viewed as a global strategy by multinationals," says Anoop Garg, vice president of systems integration and software exports at Digital India, a partly owned subsidiary of Digital Equipment Corp. "No company can have all [its] resources in one place. It is a question of [using] the global expertise of a company."

And in the U.S., people like Cairns-Rubin will find themselves having to constantly upgrade and renew their skills — or face the prospects of long-term unemployment. ■

Vijayan is *Computerworld*'s senior writer for PC hardware.

Once a genteel pensioner's paradise, Bangalore is now one of India's fastest growing cities. A large public-sector industrial infrastructure, high-quality educational facilities and a good climate have proved irresistible magnets for industry. But the frenetic growth of the past decade has taken its toll. The tree-lined boulevards are choked with vehicles, and the graceful Victorian buildings, such as the High Court building pictured here, are being replaced by modern, multistoried office buildings.

Offshore options

A growing number of countries offer inexpensive offshore software programming to U.S. companies. Here are the vital statistics on India and three of its competitors.

	Number of software development companies	Number of software engineers	Number of new software graduates every year	Average salary for experienced programmers	Destination of custom software exports	Contacts
BRAZIL	About 8,000; more than 90% have five or fewer software engineers.	Approximately 64,000; about 50% are in software development, and the other 50% are in sales, customer service and training.	Colleges and universities graduate about 4,500 computer-related professionals a year, and technical institutes graduate another 3,000 a year.	Programmers' annual salaries range from $15,600 to $32,500. Systems engineers' salaries range from $26,000 to $65,000.	Brazil exports about $30 million in software, mainly to Latin America.	Softex 2000, a software business consortium. Telephone: (954) 438-6450 (in Florida). Internet address: info@riosoft.softex.br.
INDIA	About 300.	About 130,000. Most are in software development.	About 20,000.	Salaries range from a few thousand dollars per year for new graduates to $10,000 for programmers with five years of experience.	U.S., Europe, Southeast Asia.	National Association of Software and Service Companies, India. Telephone: 91-11-6885474 or 91-11-600121
IRELAND	Approximately 500. About 100 are U.S.-based companies and some are European. The rest are Irish, and many are quite small.	Between 12,000 and 13,000.	About 12,000 computer science (or related) graduates per year. The number increases by about 20% per year.	Wages in Ireland vary from about $19,500 for a university graduate to $45,000 for someone with five or more years of experience.	At $4 billion a year, Ireland is the world's second-largest exporter of software, according to the Irish Software Directorate. Most exports go to the U.S. and Europe.	The Irish Trade Board. Telephone: 3531-2695011 (in Ireland); (212) 371-3600 (in New York).
RUSSIA	Between 100 and 120 small to mid-size companies produce custom software, mainly for bookkeeping and office automation.	From 50,000 to 60,000 programmers. Most work in private companies as software support engineers.	Ranges from 4,000 to 5,000.	Aggregate data is hard to come by, but a program manager in a medium-size company can make about $12,000 per year.	Data not available.	Alexander Prokin, president of Dator, a Moscow-based research company. Internet address: alex@dator.msk.ru; telephone or fax: 7-095-369-99-16.

Data sources: For Brazil: Eduardo Guy Manuel, president, Sigma Dataserv Informatica, an independent IT consulting and project development firm based in Curitiba, Brazil. For India: The National Association of Software and Service Companies, New Delhi. For Ireland: The Irish Software Directorate. For Russia: Dator, a Moscow-based research company and publisher of *Who's Who in [the] Russian Computer Market.*
Data compiled by: *Computerworld* and the IDG News Service.

Computer Careers

Successful systems analysts: USER FRIENDLY

Moving from programmer to systems analyst requires strong business and people skills

By Julie Hart

If you're a programmer, take heed. Possessing the latest technical expertise — including object-oriented programming, open systems and the Internet — is no guarantee your career will blossom. In fact, if you want to advance to the rank of systems analyst, technical knowledge alone is apt to work against you.

Instead, in today's client/server environment, employers are promoting programmers who have a polished set of people and business skills.

"The ability to communicate effectively is key," says Amy Resnik, assistant vice president at Pencom Systems, Inc., a recruiting firm in New York. "When we get a job requisition for an analyst, we always look for people who can communicate clearly to any type of person — not just to others in their field."

For some programmers, implementing these interpersonal skills is a major challenge. To make the transition from working alone to being part of an interactive team, programmers can spend time getting to know the people who use their company's computer systems. For example, "go out and find users who are running the system you created," says Peter Borocz, a principal of Capital Markets Technology at BZW Barclays Global Investors in San Francisco. "Simply introduce yourself, and ask them if they have any issues or questions about the system."

Developing your nontechnical skills

SOFT SKILLS

When dealing with your users:

- Listen first. Speak second.
- Balance honesty with tact.
- Write clearly and succinctly.
- Translate technical messages for nontechnical users and management.
- Empathize with users' needs.

BUSINESS SKILLS

Learn more about the company:

- Its products or services
- Company mission statement
- Target customers
- The department's role in company's success
- The competition
- Industry trends and buzzwords

Programmers also will have an easier time gaining critical interpersonal skills if they get to know their company's business. "This will increase confidence when dealing with users and management," Resnik says. "If you have a very strong understanding of your client and what their job is, you'll become comfortable speaking their language, questioning their goals and offering solutions."

To learn more about your company's business, go to your local junior college and sign up for a class relating to your company's business. Or "ask an analyst if you can go along to some users' meetings," says Doug Morgan, vice president of Toner Corp., a recruiting firm in San Francisco. "As you listen to the users, you'll begin to pick up their lingo, and you'll also see how an analyst interacts with users."

Another idea: Subscribe to the industry-specific periodicals your users read. You can also seek out your company's human resources or marketing department for information about your company's mission and competitors.

The bottom line when using your newfound people and business skills is to "remember that it's the stockholders that have a real stake in what you're doing," Morgan says. "If you always keep that in mind, you'll do much better analytic work — and have a more successful career as a systems analyst." ■

Hart is a freelance writer in Mercer, Calif.

RESOURCES

To develop people skills:

- **Your manager**
- **Training seminars**
- **Networking with others in your field via user groups, on-line chat rooms and conferences**

To develop business skills:

- **Your company's annual report, sales manual, company backgrounder or other documents**
- **Industry-specific courses (i.e., Accounting 101, Marketing 101)**
- **Co-workers in the department you develop systems for**

The lure of vendors

With the right skills and mind-set, you can find more money and freedom with vendor companies. But there are trade-offs.

By Alan Radding

For some information systems professionals, the grass is indeed greener on the other side of the fence. For those with the right technical skills, a marketing mind-set and a willingness to travel, the vendor side of the business can look very tempting. Benefits can include higher pay, a more supportive technology culture and the opportunity to have a real bottom-line impact. But it isn't the right career move for everyone.

Going from an end-user to a vendor organization isn't typical, says Mary Kay Hamm, a principal at Linden International in Wayne, Pa. It represents "a clear career choice. You're looking for different types of things," she says.

For example, those making the move can become specialized in a particular product or technology. This may limit some career options down the road but open others, such as consulting. On the other hand, for people who want to be pure techies, "it is a lot easier to be a techie in a vendor organization," Hamm says.

A short stint at Fidelity Management Co. convinced Sid Patel that life as a systems engineer in a large end-user organization wasn't for him. The problem: the layers of management. "You have an idea for something about the system, but you have to sell it through so many layers. I am just too impatient," Patel says.

Today, working on problems as a systems consultant at Pyramid Technology Corp., Patel has much more freedom to act. "If I see something, I can fix it," he says.

Vendors want people who can design, build and deliver products profitably, says Lee Silver, president of executive recruiting firm L. A. Silver Associates, Inc. in Framingham, Mass.

"They're looking for people who know how to get the product development job done," Silver says. These people will manage 150 to 300 software development engineers. The successful candidates "can't be bits and bytes people who want to write code. They must have technical development skills," he says.

For less specialized technical support, vendors may look more favorably on end-user candidates. These positions generally have a title of support engineer or technical marketing specialist and are responsible for pre- and postsale technical support.

While technical skills are important in these positions, pure techies needn't apply. "The vendors want people who are presentable to clients and prospects," Hamm advises. That means someone who is outgoing, can handle himself socially and projects a feeling of credibility and trustworthiness. ■

Radding is a freelance writer in Newton, Mass.

Advantages and disadvantages of working for a vendor

ADVANTAGES

- Supportive technical culture
- Freedom to be a pure techie
- More input as a technical person
- Better compensation
- Opportunity to develop highly specialized skills
- Direct involvement in the core business and profitability of the company

DISADVANTAGES

- Frequent travel
- Participation in selling
- More limited career track
- Requires high-demand technical skills

Successful candidates "can't be bits and bytes people who want to write code. They must have technical development skills so they don't get the wool pulled over their eyes . . . people who know how to get the product development job done."

— Lee Silver, president, L. A. Silver Associates

Systems Consultant. Provide consulting services in design & development of specialized order entry & inventory systems in an AS/400 platform environment; design & create accounting reports to provide weekly production analysis & modify existing reports using RPG, Ouery, & CASE tools; revise labor analysis reporting system to support actual & standard labor statistics with variances; develop systems to support production analysis, financial analysis, & inventory analysis; work provide systems support, systems conversion, quality assurance, performance tuning & database management working extensively with AS/400, OS/400, RPG/400, COBOL/400, SOL/400, Integra/SOL, Synon, Oracle, RPG, Ouery & CASE tools. $48,000/yr. 40 hrs/wk. M-F. B.S. or equivalent in Computer Sc. or Computer Eng. & 2 yrs. exp. in job offered or 2 yrs. related exp. as Systems Analyst or Programmer Analyst to include use of AS/400, OS/400, RPG/400, COBOL/400, SOL/400, Integra/SOL, Synon, Oracle, RPG, Query & CASE tools. Send resume to the Georgia Department of Labor, 2943 N. Druid Hills Rd., Atlanta, GA 30329-3909 or the nearest Dept. of Labor Field Service Office. Job Order #GA5939843.

SOFTWARE ENGINEER: Demonstrated ability in Graphical User Interface development in Visual C++, v 1.5 & MFC 2.5 under MS Windows 3.1 environment, Proven ability in the use of Object Oriented Development (OOD) methodologies - Yordon's Object Oriented Analysis (OOA) & Rambaugh's Object Modeling Technique (OMT); Demonstrated ability in programming in ODBC (Open Database Connectivity) standard with RDBMS. Indepth understanding of relational database architecture & programming exp in SOL; Development exp of Corporate Financial Planning & Analysis Software; Demonstrated ability in C, C++ in SUN/UNIX OS with Client Server Architecture. The job duties are: Design & develop a GUI (Graphical User Interface) in Visual C++, develop SYBASE SOL programs for financial transactions, performance tuning of existing SOL modules & to accomplish the development of above modules. Requires Masters in Computer Science with 4 yrs exp in the job offered or in Software Development. 40 hrs per week at $50,000/per year. Please send resume to Case #51305, PO Box #8968, Boston, MA 02114.

Software Engineer. Design and develop information systems, using Powerbuilder, C/C++, Visual Basic, Open Server, and SOL Server. Also, EHLLAPI, Codebase and Remote Procedure Call. Min. req. inc: M.S. in C.S. w/6 mos. exp. in above pos. or 6 mos. exp. as Programmer/Analyst or related, w/ ability to design & develop Client/Server information systems using Powerbuilder, Visual Basic, Sybase SQL, C and Open Server. 1 grad. level course or 6 mos. work exp. in: 1) Advanced Operating Systems, including Remote Procedure Call, network protocol and interprocess communications, 2) Advanced Programming languages (II), including compiler construction. $50,000./yr. 8:00-5:00, 40 hr/wk. Please send resume to: Georgia Department of Labor, Job Order #GA 5945749, 465 Big Shanty Rd., Marietta, GA 30066-3303 or the nearest Dept. of Labor Field Service Office.

Software Engineer. $61K/yr. 8a-5p; 40hr/wk Position avlble for S/ware Engr to analyze/dsgn/implmnt s/ware for EDP systms & do user reqmts analysis, relational mgmt systms & systms integration, analyze customer reqmts of databases written for Informix dsgn, coding spec, create/implmnt comp code, test/maintain/upgrade Informix RDBMS & applic performance for Informix Must have Master's-Comp Sci or Engg Must have 2yr exp in job offd or related occupation of Systms Analyst. 2yr exp should incl work on Informix 4GL, use of C, UNIX, Informix 4GTL/ISOL, ESQL, PowerBuilder, Gupta SQL Base, IBM 3270 SNA, shell prgmng UNIX utilities & systm admin. Job opportunity located in Atlanta, GA Applicant should send resume or apply in person to. GADOL, J.O.# GA 5947398, 2943 N Druid Hills Rd, Atlanta,GA 30329-3909 or the nearest DOL Field Svce Office. Must have proof of legal auth to work permanently in US. EEO/AA Employer.

Software Engineer - Atlanta/Chamblee, GA. Object Oriented Analysis, Design and software development for telecommunication application. Development of X-Windows based GUI using OOP meeting requirements such as portability and internationalization. Development of C, C++ based graphic class libraries for CAD applications. Develop real time software for scientific applications such as simulation which involves extensive mathematical modeling and software optimization. Design and develop reusable s/w library used in simulation applications. Tools used include C++, objective C, C, FORTRAN, PASCAL, X-Windows, MOTIF, UIM/X, NeXT STEP, UNIX. Hardware platforms include SUN-SPARC, RS/6000, IBM PC. Bachelor's in Computer Science or Engineering. $49,754/yr. 40 hr/wk 9-5M-F. Must have proof of legal authority to work in the U.S. Submit resume in duplicate or apply in person to: Georgia Department of Labor, Job Order# GA 5943657, 2943 N. Druid Hills Road, Atlanta, GA 30329-3909 or the nearest Department of Labor Field Service Office.

Software Engineer Must have MSCS, Eng or Math w/2 yrs exp in job or 2 yrs exp in s/ware sys dvlpmt & anal or BS w/4 yrs exp. Must have 2 yrs exp dsgning, dvlping & implementing comp sys for bus applications. Must be proficient in: COBOL, COMS, LDA, LINCLITE, NOF, DESIGNER WORKBENCH, DMINOUIRY & DMINTERPRETER ON UNISYS H/Ware. Must be willing to relocate throughout US for varying periods of time. Will dsgn, dvlp & implement lrg application comp s/ware sys, using bus & eng anal, math models, comp lang & d/bases, working in 1 or more h/ware &/or s/ware environments simultaneously for complex bus projects in-house or at client locations; analyze user's sys rqts, consult w/clients & sys engineers; study & perform sys anal on existing sys on diff platforms; dvlp specs; monitor phys aspects including installation, data propagation, optimization & maint support; dvlp & monitor results. Salary $48,000/yr. 40hpw. Svrl pos avail. Apply in person or by resume to: GA Dept of Labor, 1535 Atkinson Road, Lawrenceville, GA 30243-5601 or to the nearest Department of Labor Field Service office. Refer to Control # GA 5948998.

http://careers.computerworld.com

COMPUTERWORLD

Computerworld's 1995-96 Salary Survey is Now Available on Disk!

What are other IS managers paying their staff?

Are you offering competitive rates?

Which industries are paying top dollar?

Answer these questions and more!
with Computerworld's 9th Annual Salary Survey on disk, where compensation for 28 information systems positions is covered in 21 industries

Plus!
The Disk also includes Computerworld's first survey ever on hot skills. Find out the premiums IS managers are willing to pay for specific IS skills. Which skills are in the highest demand? Which industries are willing to pay top dollar for them? You'll find over 60 technology skills listed which include development tools, languages, operating systems, networking and internetworking equipment, RDBMSs and more. All are broken out in 14 industries and in 12 metropolitan areas.

All this for just $299.

Call today!
1-800-495-0157

Tropicana Dole Beverages North America, the chilled juice industry leader, has a number of career opportunities for talented computer professionals.

Analyst III

You will be responsible for analyzing requirements, designing applications and the construction of applications. Qualifications include 5 years of analysis/development experience and good communication and problem solving skills. Experience should include COBOL, SQL, PowerBuilder, Oracle SQL Forms and experience in Manufacturing, Warehousing and Logistics systems. Knowledge of IEF, C, CH, UNIX and Visual Basic are pluses. A BS is preferred. Job Code: A3

Sr. Specialist System Administrator

We will rely on you for day-to-day UNIX and NT system administration and technical architecture migration planning and implementation. You will need a BS and skill in many of the following areas: UNIX, NT system administration, C, C++, NIS, NFS, DNS, TCP/IP, RPC, Perl, SCCA, Imake, KSH, CSH, SCCS, RCS, PGP, sendmail, and RDBMS experience. Project planning, mentoring skills and UNIX security experience desirable. Job Code: SSA

Sr. Specialist System Management

This position will be responsible for the establishment and management of open systems system management environments and technical architecture migration planning and implementation. You will need a BS and skill in many of the following areas: UNIX, NT system administration, optical storage, UNIX security, schedulers, disaster recovery, tape and print management, C, Perl, NFS, TCP/IP, NIS, DNS, KSH, CSH, PGP, general RDBMS and SNMP/MIB development. OO skills a plus. Job Code: SSM

Optimization System Analyst
Fruit Procurement

This position is responsible for the management of the Procurement Department's seasonal planning and harvest optimization system. Qualifications include a BS in Statistics, Business or Quantitative Science and 2-5 years of experience in business applications. Experience in computer applications for optimization modeling/statistical process control a plus. Job Code: OSA

Project Manager

You will be responsible for identifying and developing business systems and information solutions for both strategic and business problems. We require 4-6 years of experience as a systems project leader managing supply chain application system implementation or 3-5 years of experience with a major supply chain software vendor. Consulting experience a plus. The ideal candidate will have skills in systems development life cycle, working knowledge or reengineering concepts, and proven project management experience. We are looking for process manufacturing experience in a large company environment. A BS degree is required; MBA highly desired. Job Code: PM

A competitive salary/benefits package accompanies these growth-directed opportunities. For confidential consideration, send resume referencing job code with salary history to: **Tropicana Dole Beverages North America, Attn: Corporate Human Resources, Job Code: __, P.O. Box 338, Bradenton, FL 34206.** Equal Opportunity Employer M/F/D/V

Tropicana PRODUCTS, INC.®

Programmer Analyst, Charlotte, NC; Design, develop and implement Customized Payroll Processing Applications in Restaurant and Retail Business Systems using Abstract Mathematics combined with C/C++, Windows SDK, Lattice, CreenLeaf and CodeBase Libraries; design and develop relational database scheme for applications using FoxPro, Dbase 4.0, Working Knowledge of Point of sale Systems and Touch-Screen terminals, develop dynamic link libraries in C/C++; provide modular, integrated testing and provide technical support to Clients. Req'd. Bachelors in Electrical Engineering or Computer Science. 1 year experience in job offered. 40 Hrs/Wk., 9am-6pm, $46,500/yr. All resumes must include the applicant's Social Security Number; and the Job Order Number NC2654506 and DOT code 030.162-014. Applicants to apply to the nearest Job Service office or to submit a resume to Job Service, 500 W. Trade Street, Charlotte, NC 28202.

MAINFRAMERS IN DEMAND!

Computer Consulting Group, one of the Southeast's premier consulting firms, has numerous staff positions available in the Southeast for IBM Mainframe Programmers. Candidates with experience in any of the following areas should apply for immediate, long-term positions: COBOL, DB2, CICS, IMS, and/or APS. Competitive salary, complete benefits package, 401(k) and much more.

Please contact Recruiting for immediate consideration or fax a resume to:

Computer Consulting Group
1-800-222-1273
FAX 1-800-539-3339
http://www.cconsulting com

Computer
Consulting
Group
Contract Professional Services

---

http://careers.computerworld.com

Unix Systems / Network Administrator

Requires:

- Strong background in HP/UX.
- SunOS, including shell, C++, and Perl experience.
- Minimum of four years experience in the following areas: Supporting/maintaining Unix and NT networks including installation, setup, and hardware/software support; Protocol expertise in TCP and IPX.
- Unidata RDBMS and Netware experience a plus.

Send letter of application, resume with three professional phone references, and salary requirements by March 15 to:

Stetson University Office of Human Resources, Campus Box 8327, DeLand, FL 32720-3756. EOE

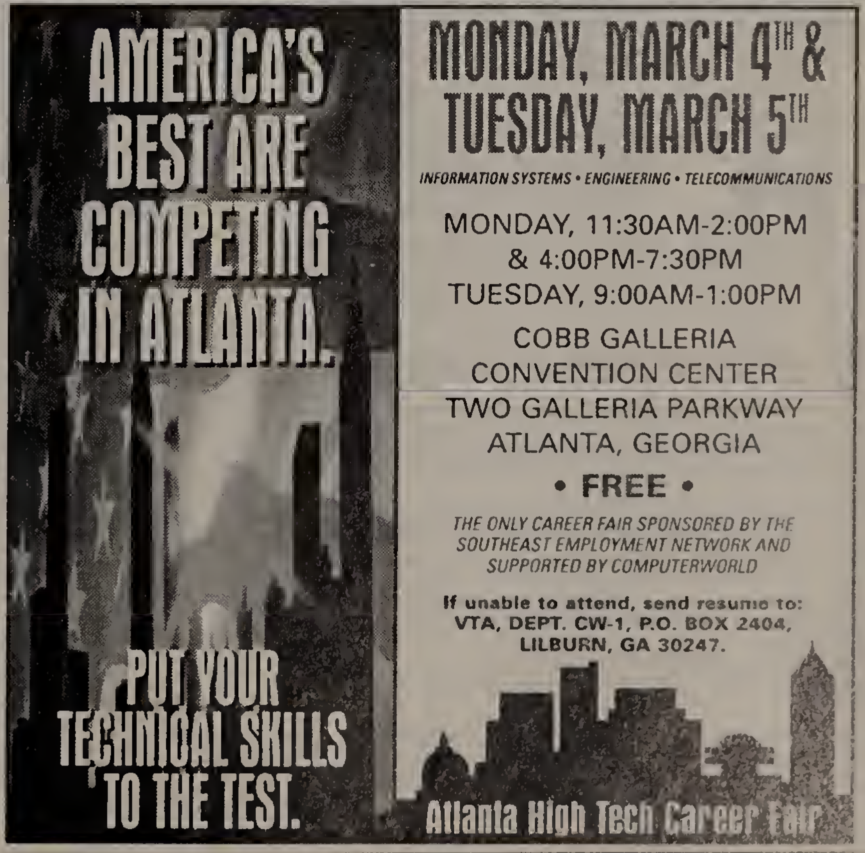
Be Part Of Our Phenomenal Growth!

The Company	GE Capital Technology Management Services (TMS) is dedicated to providing a broad spectrum of services that enable companies to utilize information technology more efficiently by combining consulting services and financing options to help businesses plan, acquire, manage, and refresh technology assets. As part of GE Capital Services, a diversified financial services company with more than $20 billion in annual revenues and over $150 billion in assets, GE Capital TMS is well positioned for rapid growth and exciting career opportunities for outstanding professionals in the Atlanta, GA, area as well as nationwide!
Application Specialists	Client/Server design and implementation experience, good business analytical skills, and background in development, support, and package selection required. Oracle, Sybase, C, PowerBuilder, UNIX, VAX/VMS, OOP.
Project Leaders	Will lead medium to large projects. Must have process improvement capability, proven project planning and business analytical skills, and a solid estimating and project execution background. Client/Server, PC Productivity.
IT Management	Will lead multiple projects and align IS and business strategies. Requires methods and standards knowledge as well as staff evaluation and planning/technology planning experience. Client/Server, PC Productivity, Project Management.
Network Consultants	Will provide proposal support as well as network planning, design, and product evaluation. Solid understanding of network operating systems, hubs, routers, WANs, and network management required.
Contact and Benefits	We offer an excellent benefits package and salary commensurate with experience. For immediate consideration, please forward resume to: **S. Maynard, GE Capital, 6875 Jimmy Carter Blvd., Suite 3200, Norcross, GA 30071 or e-mail: tms.smaynard@capital.ge.com (ASCII text format only!).** No Phone Calls or Agencies, Please!

GE Capital
Technology Management Services

An Equal Opportunity Employer, M/F/D/V.
Due to response volume, we are unable to acknowledge each inquiry.

Software Analyst. Develop, implement, test, document & support software for Workforce Management systems using advanced Database management principles & Data Communication Protocols. Program in windows using object-oriented programming, code optimization and algorithms. Use windows API, Open DataBase Connectivity (ODBC), SOL, OLE Programming in the development. The technical environment includes a LAN connecting IBM 6000, HP9000, VAX, Pentium and 486 PC's running under operating systems such as SCO, UNIX, AIX, Windows NT Server 3.5 and Netware 4.1. Programming languages used are Visual C++, Visual Basic, O+E, MS SourceSafe. Min. req. inc.: M.S. in Computer Science w/2 years exp. in above pos. or 2 years exp. as programmer or related, with knowledge of large databases, Graphical User Interface implementation experience, object oriented design using languages like C++, Visual Basic. Expertise in Visual programming skills. Knowledge of developing client/server front-ends, Systems integration, Network administration. Design and development of network protocols. Knowledge of Windows NT Server, AS/400. 9.6, 40.0 hr/wk. $41,002/yr. Applicants send resume or apply in person to: Job Service of Florida, 701 SW 27th Ave., Room 47, Miami, FL 33135-3014, Re: Job Order # FL-1379827.


AMERICA'S BEST ARE COMPETING IN ATLANTA.
PUT YOUR TECHNICAL SKILLS TO THE TEST.
Atlanta High Tech Career Fair

MONDAY, MARCH 4TH & TUESDAY, MARCH 5TH

INFORMATION SYSTEMS • ENGINEERING • TELECOMMUNICATIONS

MONDAY, 11:30AM-2:00PM
& 4:00PM-7:30PM
TUESDAY, 9:00AM-1:00PM

COBB GALLERIA
CONVENTION CENTER
TWO GALLERIA PARKWAY
ATLANTA, GEORGIA

• FREE •

THE ONLY CAREER FAIR SPONSORED BY THE SOUTHEAST EMPLOYMENT NETWORK AND SUPPORTED BY COMPUTERWORLD

If unable to attend, send resume to:
VTA, DEPT. CW-1, P.O. BOX 2404,
LILBURN, GA 30247.

University *of* Pittsburgh Medical Center
Information Services Division

Peoplesoft Lead Systems Engineer

Seeking an individual to support the technical environment of the Peoplesoft Human Resource Management System. Proven experience with the Peoplesoft HRMS, UNIX, and Oracle/SYBASE relational database management systems is required. Previous experience with upgrades to Peoplesoft HRMS, process scheduler and SQL/SQR. This individual will be responsible for supporting and enhancing the production environment of Peoplesoft HRMS as well as developing technical specifications and supporting documentation. #00003586

Decision Support Systems and Executive Information Systems Project Leader

Seeking an individual to manage the implementation of Executive Information Systems, Decisions Support Systems and Data Warehouse Projects. Familiarity with UNIX, Windows NT, relational databases, multi-dimensional OLAP databases and GUI application development tools (PowerBuilder, Powerplay or Impromptu) is preferred. Position will involve defining functional requirements of hospital executives and top management and developing technical specifications. This individual will be responsible for managing a project team of system analysts and programmers. Graduate level education is preferred. #00000001

Software Engineer II

Seeking an applications programmer position working with HBOC Medipac Hospital billing and Registration Systems. Proven systems analysis and programming experience required and previous experience in hospital billing preferred. The qualified candidate will program in an on-line and batch environment supporting Medipac 3.0.

The following technical experience is desired:

MVS/ESA, JCL, VSAM, CICS, TSO/ISPF, Mainframe Utilities, TCP/IP, Programming in COBOL II, ADSPLUS, OS/2, Personal computer skills. #00000004

Senior System Engineer - Hospital Services

Seeking an individual to work with a multi-disciplinary team to establish an integrated order management system in conjunction with development of an integrated electronic health record. Proven systems analysis and programming experience required and previous experience in mainframe, PC and UNIX environments and clinical systems development preferred. #00003589

NT Systems Administrator

To support the continued expansion of the LAN Systems Administration group as UPMC implements Microsoft's Back Office Suite of Windows NT Applications, we are seeking an experienced NT Systems Administrator. The successful candidate will work with the LAN Administration team on the implementation of a multi-site NT infrastructure and provide support to Client Departments' Local Area Networks. This individual must have proven experience in a Windows NT Server environment and have extensive knowledge in supporting complex, networked windows PCs. Novell LAN management, Microsoft SMS and Macintosh support experience also desirable. #00002948

Clinical Systems Support Lead

Seeking an individual to work with a multi-disciplinary team to manage system support for a number of clinical applications such as Radiology, Pharmacy, Pathology, and Labs in an open system environment. Proven system analysis experience in UNIX, VMS, and relational databases required. This individual will be comfortable working as a liaison with hospital clients in various clinical departments and in supervising a programming team. #00000565

Software Applications Programmer

This is an applications programmer position working with the clinical information systems at the Western Psychiatric Institute and Clinic. The qualified applicants will program and maintain on-line screens, batch programs, and ad-hoc reports. This position also maintains additional clinical systems (Pharmacy, Laboratory, Medical Records). A bachelor's degree in computer science or related field is required. A master's degree is preferred. Prior work experience in a health care setting is also desired.

The following technical experience is also required:

Relational database concepts, preferably Sybase, SQL, Programming in a fourth generation language, preferably Unify Accell, UNIX skills, Personal Computer skills. #00002912

System Engineer - Hospital Services

Seeking an individual to work with a multi-disciplinary team to establish an integrated order management system in conjunction with development of an integrated electronic health record. Proven systems analysis and programming experience required and previous experience in clinical systems development preferred. #00000003

System Engineer - Custom Application Development

Seeking an individual to work with a multi-disciplinary team to develop custom applications in support of a wide variety of end user requirements. Proven systems analysis and programming experience required, B.S. in Computer Science preferred. Previous experience with object oriented methodologies, GUI application development tools (PowerBuilder, Microsoft Access, Visual Basic), relational databases preferred. #00002896

Please submit resumes, referencing the corresponding position #(s) to: **UPMC, 200 Lothrop Street, Pittsburgh, PA 15213, Attention: TJB.** EOE

SALES MANAGERS

SCB Computer Technology, Inc., a national systems integrator/information management consulting services firm, has an outstanding opportunity for **Senior Sales Managers** concentrating in Utility Industry Sales or Outsourcing Sales. We are a rapidly growing, employee-oriented company and we believe in achieving our goals through teamwork. This opportunity requires a degree and at least five years successful sales history in these professional environments. A background in data processing sales is desirable and a commitment to excellence and hard work is a must. We offer an outstanding compensation package and opportunity for career advancement. If you fit this description and are intersted in joining a recognized industry leader in the rapidly growing outsourcing professional services field, **please mail or fax resume to our corporate headquarters address:**

SCB Computer Technology, Inc.
Attn: Debbie Perdzock
1375 West Brierbrook Road
Memphis, TN 38138
FAX: 901-759-4836
Equal Opportunity Employer

DATA PROCESSING PROFESSIONALS

SCB Computer Technology, Inc., a National Systems Integrator/Information Management Consulting Services Firm **has immediate long-term opportunities throughout the country for Programmers, Analysts and Consultants.**

We are currently looking for individuals possessing any of the following skills to fill Programmer Analyst positions:

- IMS DB/DC
- DB2
- COBOL
- CICS
- VAX/VMS
- AS400
- IDMS
- TELON
- NOVELL
- INGRES
- DEC FORMS
- RPG
- SMALLTALK
- ADABAS/ NATURAL
- GUPTA
- ORACLE
- CASE TOOLS
- UNIX/C
- SAP R/2 or R/3

SCB offers competitive salaries, a comprehensive insurance package, employee stock option plan and a 401K program. **Take your first step toward making your career complete by sending or faxing your resume to:**

SCB Computer Technology, Inc.
Attn: Debbie Perdzock
1375 West Brierbrook Road
Memphis, Tennessee 38138
FAX: 901-759-4836
An Equal Opportunity Employer

PROGRAMMER/ANALYST

The world leader in separation and centrifuge technology, Alfa Laval continues to build on over a century of experience. We are currently seeking a Programmer/Analyst in our I.S. Department with these abilities and qualifications:

- Design, code, test and debug software programs.
- Provide technical assistance to programmers, analysts and computer operators.
- Modify, install, test and maintain complex software packages.
- Associate degree in Computer Science with 7 years experience with AS400 and 3 years experience with BPCS system.
- Business experience with distribution, sales and marketing systems.
- Experience with Bar Coding and EDI.
- Strong interpersonal, communications and organization skills

We offer a competitive salary with excellent benefits package, including 401 K. Please submit resume with salary history/requirements to: **Alfa Laval Separation Inc., Human Resources Dept. PK, 955 Mearns Road, Warminster, PA 18974.** Fax: 215-443-4253 EOE M/F/D/V

SYSTEMS ANALYST to analyze, design, develop, code and test application software in a client/server environment for large billing systems for the cellular industry that include rating, billing, collections, point of sale and customer care systems modules on IBM mainframes using COBOL-II, CICS/MVS and DB2/SOL. Develop user-friendly online interfaces using SP-II on OS/2 and GUI standards for user presentation, communication and database access modules. Require: B.S. degree in Computer Science/Engineering with two years of experience. At least one year of the required experience must be in the development of billing systems for the cellular industry. Extensive travel to client sites within the U.S. is required. Salary: $40.00/hour; M-F, 8:30a.m. to 5 p.m. Apply with resume to: Georgia Department of Labor, Job Order # GA 5944584, 465 Big Shanty Road, Marietta, GA 30066-3303 or the nearest Department of Labor Field Service Office.

Software Engineer/Systems Analyst: 40 hrs. week, 8:30am-5:30pm, $41,005.00 a yr. Job is in Gainesville, FL. Masters in Computer Science/Statistics and 5 yrs. exp. in job offered. Design and develop a new client-server architecture for an existing mainframe computer application. Use oracle database system as the data repository, and access the data using sequential query language programming (SOL). Implement a windows-based graphical user interface (GUI) for the software using object-oriented programming concepts and programming in C, C++ and Windows. Take part in the porting and testing of various modules of the software, using experience in operating systems, including DOS, UNIX and statistics. Participate in any future projects that deal with statistical analysis and use of statistical tools. Send resume to Tallahassee Jobs and Benefits Service Center, 2810 Sharer Road, Suite 30B, Tallahassee, FL 32312. J.O. #FL-1377167.

FLORIDA
OPPORTUNITIES FOR DP PROFESSIONALS WITH:

INFORMIX
NewEra
Consulting Partner

- IDMS/ADSO
- UNIX/BGS/BEST/1
- COBOL II/DB2/IMS
- UNIX SYSTEM ADMIN
- PACBASE/PACDESIGN
- AS/400 SYSTEMS OPER
- COBOLII/CICS/MEDICARE
- PICK DEVELOPERS/UNIX/NT
- MF COBOL/UNIX
- C++/UNIX/MOTIF/OSP
- INFORMIX DBA/4GL/ISQL
- NETWORK/BANYON/3COM
- EDA/SQL/FOCUS/UNIX/MVS
- PEOPLESOFT/UNIX/SQR/HR
- TANDEM/COBOL/SCOBOL/SQL
- TECHWRITER/INTERLEAF/DEC

FOR IMMEDIATE CONSIDERATION CALL OR FAX RESUME TODAY

Syslogic

(800) 797-5644
(813) 287-0054

P.O. Box 26146
Tampa, FL 33623

FAX
(813) 282-9511

DP STAFFING SINCE 1969
PERMANENT FL. OPPTY'S

Data Architects / Modeler	$95K
Sr. P / A CICS Client Ser	$53K
DBAs Sybase / Oracle7	$65K
Sr. Sys Prog MVS / ESA	$58K
S / E BS Ada & SQL	$52K
P/A's GIS Unix C / C++	$52K
Team Ldr C++ MFC TCP	$65K
P/A's Oracle Forms SQL	$55K
P/A's POS IBM 4680	$47K
P/A's Cobol CICS DB2	$45K
S\E Unix Mentor / SDRC	$47K

AVAILABILITY, INC. Dept C.
P.O.Box 25434
Tampa, Fl. 33622
813/286-8800, Fax 286-0574
availability@delphi.com

Senior Systems/Network Information Engineer: Plan, design & produce technical documentation for telecommunications network development, management & operational environment; analyze/review departmental/member airline requirements; establish work plans/schedules & coordinate with technical development to ensure project execution, by utilizing experience in ultra high-speed network data-switching, systems structural analysis, real-time transaction processing & project development/planning techniques, including advanced/medium/low level telecommunication data transmission/reception techniques; protocol/control procedures (X.25, HDLC P3000, SDLC, UDLC, SLC P1024/P1124/P1140, AX25, SEEP, NCBs); Type A/B services; Distributed Communications Processors (DCP/50-52, DCP/40-42, DCP/30, DCP/OS); network performance/Node/Concentrator Configuration analyses; Best/Logical route & Quality of Service analyses, interception performance; link statistical analysis (connection/load information); data supervision techniques; network contingency planning. 40 hrs/wk; 8:30-5:00; $61,144/yr. Rqmts: B.S. in Info. Systems & 1 yr. exp. in job offered or as Technical Writer/Analyst for Airline Telecommunication Network Systems with above identified exp; or if without degree, 3 yrs exp. in job offered or as Technical Writer/Analyst for Airline Telecommunications Network Systems with above identified exp. Apply in person or by resume to: Georgia Department of Labor, Job Order #GA 5947202, 465 Big Shanty Rd., Marietta, GA 30066-3303, OR the nearest Department of Labor Field Service Office.

KCS Computer Services is a premiere system integration, training, and custom software development organization. KCS is seeking Systems and Data Architects, Analysts, Programmers, and Communications Experts in Mainframe and Client/Server environments. In addition, KCS seeks industry experts in Banking, Healthcare, Manufacturing, and technical experts in Multimedia and MicroSoft. The following are typical skills required:

- **UNIX/OS2/NT/NOVELL**
- **ORACLE/INFORMIX/ INGRES/SYBASE/SAP**
- **VISUAL BASIC/VISUAL C++ POWERBUILDER/C++**
- **C/MICROFOCUS COBOL**
- **COBOL/CICS/NATURAL**
- **IMS/DB2**

KCS has offices in Pittsburgh, Philadelphia, Atlanta, Phoenix, Cleveland, and San Francisco.

KCS Computer Services, Inc.,
777 Penn Center Blvd., Suite 600, Attn: CW2, Pittsburgh, PA 15235-5906

Phone (412) 823-8632
Fax (412) 823-8821
http:\\www.kcscomp.com

RELOCATION SPECIALIST
IBM MAINFRAME
PC - CLIENT SERVER

I specialize in relocating DP professionals to growth areas of the United States. Fees Paid by hiring company. 16 years DP Search & Placement experience.

John M. Cook
COOK & ASSOC., INC.
P.O. Box 1778
Duxbury, MA 02331
1-617-934-6571
Fax: 617-934-6399

SENIOR PROGRAMMER/ANALYST - Perform systems analysis and testing of large scale client server applications development using Oracle, Sybase and PowerBuilder. Modify and enlarge internal computer systems. Develop interfaces, scheduling software, skeleton reports and GUI interface. Develop user interface screens using Oracle 6 as well as development of a requirements definition and logical physical database design and using silverrun case tool. Requires Bachelor's degree in Electrical Engineering or Computer Science. 2 years experience as Senior Programmer Analyst or as Systems Analyst of which one year of experience must have involved use of the following hardware, software, operating systems and programming languages: Dynamic Pro*C, UNIX, ORACLE, PowerBuilder/Sybase application, Visual Basic 3.0, DB2, C, C++, structured analysis/design and structured programming methodologies and the development of client server applications using Visual Basic and PowerBuilder development tools. 8-5, 40 hrs./wk, $72,500/yr. Send resume to: Job Service of Florida, 2660 West Oakland Park Blvd., Fort Lauderdale, FL 33311-1347. Refer to J.O #FL-1370677.

Herd Utilization Analyst: Analyze and report health care utilization as required by departmental activity. Develop & maintain electronic information systems for the Health Economic Dept. (HERD). Assist w/SAS programming & interface designing. Use SAS, SCL, FoxPro, ABC-flowchart to maintain & document all existing data processing systems under PC & IBM Mainframe environment. Resolve program failure & expand the current system's capabilities. Min. req. inc: M.S. in C.S. or Management Inform. System (B.S. or M.S. in Public Health or related, Also required) 1 college-level course (9 sem. grad. hours or 9 semester undergrad. hours) or 6 mos. work exp. in the following: 1) PC, IBM, Mainframe environment documentation; 2) Debug report using SAS language in IBM mainframe environment; 3) Analyze, design, code, & test on-line Automated Matrix Processing System programs using SAS language; 4) Exp. w/SQL to retrieve data from DB2 environment. 5) Exp w/Amipro, Lotus, Freelance to write reports. Must pass the programmer Aptitude Test. $31,121/yr. 8:00-4:15. 40 hr/wk. Please send resume to: Charles Turner, Attn: TN - 6200118, TN Dept. of Employment Security, 311 Martin Luther King Blvd., P.O. Box 11088, Chattanooga, TN 37401-2088.

SOUTHEAST

- **DB2/CICS/APS**
- **IMS DB/DC**
- **Visual Basic**
- **MS Access**
- **NATURAL/DB2**
- **AS/400/BPCS**
- **SAP**
- **AIX/UNIX/C/C++**
- **RDB**
- **Fortran/Ingres**
- **TPF**

• Contract Services •
• Competitive Salaries •
• Hourly Rates •
• Outstanding Benefits •

ACP
P.O. Box 11159
Columbia, SC 29211
800-933-9227 or (803) 256-2343
FAX: (803) 779-1955
ACP@ACP.COM
EOE

SOFTWARE ENGINEER to design, develop and maintain complex software on multiple operating system environments including DOS/Windows, OS/2 Warp and WIN95 onto a single hardware platform; build and integrate compatibility issues of data systems with various components such as hard disks, sound cards, modems, video chip sets and network adaptors on IBM personal computers; using microprocessor architectures, write value added multimedia applications in VX-Rexx and Visual Basic and maintain and support the source code on CMVC; develop network applications with protocols such as TCP/IP and NetBIOS using object oriented languages on continuous basis. Require: M.S. in Computer Engineering and one year experience in the job offered or as Research Assistant; experience to include one year with OS/2, DOS and Windows using VX-Rexx and Visual Basic; experience may be concurrent. M.S. must include one course each in Object Oriented Software Design, Multimedia, Multiprocessor Architecture and Computer Networks. 40% paid travel required within the United States. Salary: $44,000 per year, 8:30 am to 5 pm, M-F. Apply by resume to: Job Service of Florida, 2660 West Oakland Park Blvd., Ft. Lauderdale, FL 33311-1347, Job Order # FL-1382051.

Database Administrator, Charlotte, NC; Perform DBA tasks on MVS, VM, for IMS & DB2 databases. Design, develop and implement databases using Oracle 7, Power builder, FOX PRO. Write codes in C++, Visual Basic, & SOL. Perform database mapping and design for hierarchy, relational & distributed databases. Perform space management and database performance, tuning and install/upgrade Information Management System (IMS), SOL, DS and DB2 applications. Req'd. Bachelors or Equiv in Computer Science or Elect. Engg. 2 years experience in job offered or 2 years experience as Software Engineer. 40 hrs/wk, 9am-6pm, $48,500/yr. All resumes must include the applicant's Social Security Number; and the Job Order Number; and the Job Order Number NC2654438 and DOT code 039.162-010. Applicants to apply to the nearest Job Service office or to submit a resume to Job Service, 500 W. Trade Street, Charlotte, NC 28202.

IBM MAINFRAME

DBA'S.DB2 or IMS	hi $50s
SYS PGMR.IMS	mid $60s
DASD MANAGEMENT	mid $50s
SR SYS PGMR.MVS	mid $60s
P/As.(25).COBOL.CICS	hi $40s

OTHER NEEDS

SYS PGMR.TANDEM.BASE24	$60s
SYS PGMR.DECNET.OSI	$60s
SYS ADM.VAX or SOLARIS	$50s
S/E.UNIX.C++	$70s
MGR AS400.MFG.COBOL	hi $50s
P/As.(12).AS400.RPG.JDE	$50s

AMERICAN PERSONNEL, Inc.
P.O. Box 667386
Charlotte, NC 28266-7386
(704) 398-1899
FAX (704) 529-1027

Recruit The Best!

Place your advertisement in regional or national editions of *Computerworld's* Computer Careers section. For more information, call Lisa McGrath.

800-343-6474
x8201
(in MA 508-879-0700)

PROGRAMMER ANALYST: Responsible for the design, development & maintenance of databases using Sybase System 10, V4.91 and Microsoft SQL V4.21. Must have strong SQL skills and be able to write all necessary triggers, procedures and queries. Must have had experience installing, tuning, and developng on Sybase System 10. Responsible for the admin., management & tuning of the operating environments for these databases using SCO Unix, Solaris, AIX, Windows NT V3.5 and OS2. Must be able to network these operating systems using TCP/IP, DNS, NIS and Unix basic modem connectivity products. Must be able to do basic administration and internetworking with Novell 3.11 Lans. Must have strong design and development skills to develop software applications using Powerbuilder, C, Microsoft Access, SQR, & Clipper V5.2. Must have strong commercial background and ability to communicate & work with management on design issues & produce supporting documentation. Must be able to use CASE technology & write technical documentation. Must be willing to relocate within the U.S on a project-by-project basis. Required computer skills: C (Borland C & Microsoft C), C++, CBASE 4, CERES, COBOL, CLIPPER V5.1, V5.2, DB LIBRARY (SQL), dBase III, dBase IV, FOXPRO, INFO BASIC, INFORMIX SQL, INFORMIX 4GL, MICROSOFT ACCESS & SQL V4.21, OS2 SQL V4.21, Powerbuilder, Sybase SQL V4.91/ System 10/SQR for Windows/ SQR, System Builder, Triton Tools, Turbo Pascal, UNIX Shell Scripting (BSH, CSH, KSH). Operating Systems: AIX, DOS, HPUX, NOVELL V3.11, OS2, PRIME, SCO UNIX & XENIX, SOLARIS V2.1, SYSTEM V (UNIX) Windows/NT V3.5. Protocols: DNS, LAN, NIS, TCP/IP, UNIX Loc. Net & Wan. Must have BS Degree or equiv. in Bus. Info. Sys. and 4 years' work experience. Hrs: 9a-5p, M-F. $40,000 per yr. Apply to Georgia Dept. of Labor, Job Order #GA 5946266, 2943 N. Druid Hills Rd., Atlanta, GA 30329-3909 or the nearest Dept. of Labor Field Service Office.

A WORLD OF OPPORTUNITY

SDS is a recognized leader in Information Technology. Our continued success is based on our professional Staff and commitment to quality. Our Staff enjoy new challenges with various levels of responsibility, while receiving above average salaries, and complete company paid benefits. We currently have over **80** permanent or contract openings in NC, SC, GA, and TX for Programmers, Business Analysts, and Consultants with any of the following skills:

APS, DB2
CICS
IMS DB/DC
AS/400
EDI
Ideal/Datcom
JD Edwards
Client/Server
Clipper/Delphi
SmallTalk
Oracle
Sybase
PowerBuilder
Ada/Natural

For immediate consideration send resume or call NOW!

Software Data Services, Inc.
4600 Park Road, Suite 109
Charlotte, NC 28209
(704) 521-8077
(800) 521-8077
FAX (704) 521-8078

COMPUTER PROGRAM ANALYST: Development and implementation of complex business application. Combined the latest technology with business function into technical specification utilizing management information systems into diverse industries and business environment providing experience in RDBMS packages, such as Oracle V7 and Sybase System 10. Assuming rapid systems development through object oriented and imaging systems such as POWERBUILDER and C++ Special Requirements: knowledge of Polish and Russian languages. Minimum education and experience: Master Degree in Computer Science and Business Administration plus 5 years of experience. Rate of pay $45.00 per hour. Send Resume to: The Philadelphia Job Bank, J.O. No. 6003364, 444 N. 3rd Street - 3rd Flr, Philadelphia, PA 19123

At Philip Morris U.S.A., we pride ourselves on planning for the future. That's why building on our advanced information technologies is an ongoing pursuit. Join one of the nation's most respected manufacturers and marketers of consumer goods for an experience offering exciting professional challenges and incredible growth potential.

LEAD SYSTEMS ANALYST

As a lead analyst, you'll direct IS activities and mentor team members to achieve set objectives. Responsibilities include on-site infrastructure planning, purchasing computer resources, integrating business applications between facilities, budget management, and technical support for PC, network and server technologies.

Requires a BS degree in Information Systems or Computer Science, or the equivalent, and a technical understanding of manufacturing business areas. Experience with DEC, Microsoft NT and network management tools, and PCs running Microsoft products in a network environment is essential. Excellent follow-through, and strong leadership and communication skills are a must. An understanding of MIP principles is preferred.

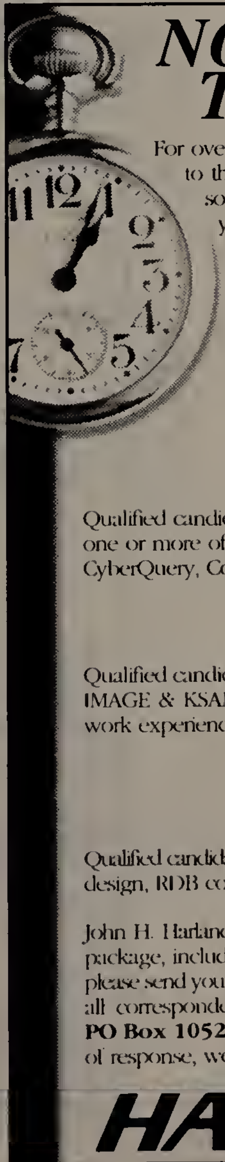
SYSTEMS ANALYST

We'll depend on you to analyze, design and implement information security infrastructure in a distributed client/server environment. Supporting security solutions, documenting security standards and training personnel are also key responsibilities.

Requires a BSEE, BSCS or similar technical degree (or the equivalent), and 2+ years of experience with UNIX operating systems administration and set-up. Effective planning, management and organizational skills are essential. The ability to communicate effectively is also necessary. A background in training, and knowledge of Windows NT, Macintosh computers and authentication systems (such as Kerbros) are preferred.

Philip Morris U.S.A. offers competitive salaries and comprehensive benefits. For consideration, send your resume, indicating position of interest, to: **PHILIP MORRIS U.S.A., Human Resources, Dept. CW0196, P.O. Box 26603, Richmond, VA 23261.** Philip Morris is an Equal Opportunity/Affirmative Action Employer and encourages minority and female applicants to apply.

Philip Morris U.S.A.



NOW is the time… *THIS* is the company.

For over 70 years, Harland has excelled in providing products and services to the financial industry to include check printing, automation, marketing solutions and other diversified products. As part of the Harland team, you'll be at the forefront of the company's...

- **Evolution into a Client/Server environment**
- **Re-engineering major business processes & systems**
- **Upgrading technical skills & tools**
- **Multi-tasking & PC environment**

PROGRAMMERS & PROGRAMMER ANALYSTS
Atlanta Headquarters
(Job Code SH-ME)

Qualified candidates will have a minimum of 2 years programming experience and one or more of the following skills: VAX/VMS, VMS DCL, C, Visual Basic, Delphi, CyberQuery, Cobol II, CICS, JCL &/or DB2.

Baltimore Opportunities
(Job Code ME-PA)

Qualified candidates will have 3-7 years HP3000 experience utilizing COBOL, VIEW, IMAGE & KSAM, a Bachelor's degree (Computer Science preferred) or equivalent work experience; 1-2 years applications systems design experience preferred.

DATA ADMINISTRATOR
Atlanta Headquarters
(Job Code ME-DA)

Qualified candidates will have 5+ years related experience including a COBOL, application design, RDB concept & architecture background.

John H. Harland offers ongoing training, a competitive salary and a complete benefits package, including stock purchase and 401(K) plans. For confidential consideration, please send your resume and salary requirements, referencing the job code on envelope/ all correspondence, to: **Corporate Recruiter, JOHN H. HARLAND COMPANY, PO Box 105250, Atlanta, GA 30348; FAX (770) 808-4996.** Due to volume of response, we are unable to respond to all inquiries.

HARLAND

Equal Opportunity Employer
M/F/D/V;
Minorities Encouraged To Apply

C O N S U L T A N T S

and you'll be heard across the country and throughout the industry! SEEK Consulting is a rapidly growing, full-service contract placement firm — and when you speak, we listen. As market savvy staffing specialists, we actively promote the interests of the companies we work with and the consultants who work with us. Whether you're a hiring manager in need of a network of technical talent, or a career minded systems professional seeking a wide range of challenging assignments, think of SEEK Consulting as your partner — your voice in today's marketplace.

SEEK OUT SEEK

SEEK

Current Contract Opportunities Available Throughout the U.S.:

- **VC++ 4.0, NT or Win 95**
- **VC++, MFC, OLE**
- **C/C++, UNIX, TCP/IP**
- **C++, X-Windows, Motif**
- **C++, Windows, OWL**
- **C++, SNMP, MIB Development**
- **Delphi, Windows, VC++**
- **PowerBuilder/Sybase, Oracle**
- **Oracle/Sybase DBAs**
- **Oracle, Forms 4.5, Developer/Designer 2000**
- **Visual Basic, Access or SQL Server**
- **OOA, OOD, Architects**
- **Oracle Financials**
- **BAAN/Triton or SAP R3**
- **Intel, 80960, VxWork**
- **C, Assembly, 68HC11 or 68302**
- **BIOS, Firmware, 80x86**
- **NT device drivers/Internals**
- **DOS/Windows Driver Development**
- **UNIX Device Drivers, SCSI**
- **NDIS drivers, Ethernet drivers**
- **HP OpenMail, cc:mail**
- **HP OpenView, Operations Ctr., HP PerfView**
- **Frame Relay, ATM, Networks design**
- **MS Mail Administrator**
- **Open VMS, NT, administration**
- **AIX System Administration, High Availability**
- **HP OpenView, SNMP, bridges, routers**
- **TDMA, CDMA, SS7**
- **ASIC designers**
- **Digital Design, FDDI**

Enjoy all the advantages of partnering with SEEK, including our state-of-the-art *SCREAM*™ database. Stop searching for the perfect position - instead, SEEK ongoing opportunities by sending your resume to: **SEEK Consulting Group, Inc., Attn: Dept. CW, 401 Edgewater Place, Suite 130, Wakefield, MA 01880; Phone: 1-800-274-1174; Fax: (617) 246-8246; Internet: jobs@seekcon.win.net**

OPPORTUNITIES AVAILABLE IN ATLANTA

- **VAX, C, COBOL, Ingres**
- **PowerBuilder, Sybase**
- **Visual Basic, Access**
- **CINCOM**
- **MFG/PRO**
- **C, UNIX, RDBMS**
- **AS400, COBOL**

Please contact **Jim Paul at (404) 250-3268** for more information or fax your resume to **(404) 250-3296. SEEK Consulting Group, Inc., Attn: CW, 5775 Peachtree Dunwoody Road, Bldg. E, Suite 200, Atlanta, GA 30342.**

SEEK CONSULTING

Software Development Engineer - Provide services to customers in development of equipment control systems & intermodal transportation systems; define customer specifications & systems requirements to construct & implement software packages; design and/or enhance & implement software on the IBM-3090 system under MVS/ESA using Cobol, CICS, DB2, ADABAS, ADAPREP, VSAM, JCL, EXPEDITOR & TSO/ISPF; develop databases for maintaining transportation & equipment controls; oversee integration, conversion & testing of software systems; finetune mainframe applications & provide needed technical support. $47,500/yr. 40 hrs/wk. M-F. U.S. or foreign equivalent B.S. in Computer Sc. or Computer Eng. & 2 yrs. exp. in job offer or as Software Engineer or Sr. Systems Analyst. Related exp. should include use of specific noted technical skills. Submit resume to the GA Dept. of Labor, 2943 N. Druid Hills Rd., Atlanta, GA 30329-3909 or the nearest Dept. of Labor Field Service Office. Job Order #GA5939700.

S/W dev. Engr. Req. MS in EE/CS and 4yrs. exp. Exp. incl. in Verilog, PLI, C, C++ on SUNOS, EDA tools from Cadence, Viewlogic, Synopsys, Xilinx and IKOS. Know. of EDA s/w flow, VHDL, Logic/Fault Sim. SDF, delay calc, VCD, A/D sim. sim./syn. issues with HDLs. Resp. design & dev. EDA s/w in the areas of digital sim. & frontend. Salary $5000/mo. Jobsite/interview; Manchester, NH. Send this ad & resume to JOB# 96-036, PO Box 989, Concord, NH 03302-0989.

Information Systems Development Data Warehousing Specialist

Humana Inc., one of the largest and fastest growing managed health care companies, with over 3.8 million members nationwide, currently has an outstanding opportunity for a Data Warehousing Specialist to work in our corporate headquarters located in Louisville, KY.

The successful candidate will research and analyze existing operational databases to determine data warehouse requirements in order to design and develop a data warehouse. Qualifications include 2 to 5 years practical experience developing a data warehouse for a large corporation, as well as strong analytical and verbal/written communication skills. The ability to interface with different types of users; including corporate, markets, data administrators and data base administrators is essential. Application development experience is desired in one or more of the following: COBOL, DB2, CICS and VSAM.

We offer an excellent salary and benefit package. For confidential consideration, please fax or send your resume, with salary requirements to:

Tim Heard
Human Resources - 4th Floor
Humana Inc.
500 West Main Street
Louisville, KY 40202
Fax: (502) 580-3443

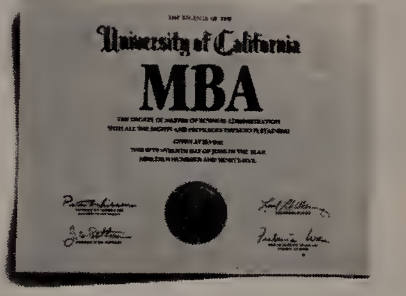
E.O.E. Drug-free Environment

Humana

SUCCESS IS A LONG HARD JOURNEY,

Our MBA students get accustomed to life in the fast lane - particularly those for whom information technology is a driving force.

It's no wonder. **Our IT faculty ranks in the Top 20 nationwide** according to a *US News & World Report* study. And a recent *Computerworld* survey determined that **the salaries of our graduates ranked in the top 2% for IT professionals nationwide.** *That's* fast-lane results!



HERE'S THE SUPERHIGHWAY.

As an IT professional with a broad management background, the quality of your decisions can alter the course of your organization – generating new strategic options, influencing markets and creating competitive advantage. And *that* can ignite the pace of your career!

Secure a Limited Spot!

We're now accepting applications for a limited number of spots in our MBA track in IT. ***Call (800) 832-5956 to keep your career in high gear!***

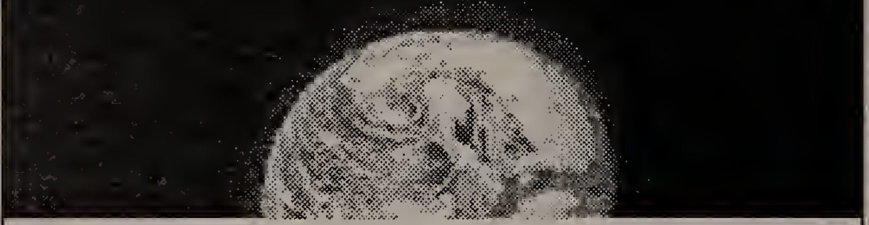
UNIVERSITY OF CALIFORNIA, IRVINE
Graduate School of Management

Find us on the worldwide web at:
http://www.gsm.uci.edu

Programmer Analyst (2 openings) to consult with clients to ascertain & define their business requirements or problem areas & utilize technical expertise to provide solutions to client needs; analyze, design & develop computer software for clients EDP systems; analyze, design & develop integrated insurance claims system including process flow & data tlow design, datamodelling, database design, technical support & meetings with users to gather requirements; technical support provided for design of application using IDMS or DB2 using IBM 3090, LAN, MVS/ESA, LAN Manager, IDMS or DB2, TSO, SQL Server, PowerBuilder, Sybase, MDI Gateway: Reqs. Bach. in Comp. Sci., Electrical, Electronic & Communications or Computer Engg., Systems Analysis, Computer Information Systems, Math or equiv. in ed. & exp., 2 yrs. exp in job offered or 2 yrs related exp such as Systems Analyst, Programmer, Software Engineer, Consultant, Assist General Manager or Systems Manager. Will accept 3 yrs. college ed. plus 3 yrs exp in job offered or related occup. in lieu ot req'd ed. & exp. Related exp must include client/server architecture. Must have exp. in handling projects using RDBMS, PowerBuilder, Sybase/SQL Windows, !DMS, $52,000/yr.; 40 hrs/wk 8a-5p. Send resume to 7310 Woodward Ave., Room 415, Detroit, MI 48202. Ref. #23596 "Employer Paid Ad"

Programmer Analyst (2 openings) to consult with clients to ascertain & define their business requirements or problem areas & utilize technical expertise to provide solutions to client needs; analyze, design & develop computer software for clients EDP systems; develop distributed networking insurance information system on multiplatform (IBM 3090, PC-LAN, OS/2 & UNIX) in which client system builds the query & route to an appropriate server through X.400, LU 6.2, LAN to Unix, IBM 3090, OS/2 & receives response while server module polls line for the query & responds to client with appropriate data; design, develop & implement system which meets user specification/requirement of various communication protocol modules which runs on IBM 3090, Unix, PC-LAN server & PC client; Reqs. Bach. in Comp. Sci., Electrical, Electronic or Computer Engg., Systems Analysis, Comp. Info. Systems, Math or toreign equiv., 2 yrs exp in job offered or 2 yrs related exp such as Systems Analyst, Programmer, Software Engineer, Consultant or Project Leader. Must have some related exp including implementing IEEE 802-2, ISO & CCITT recommendations & designing & developing using X.400, LAN, C, IBM 3090, X.25 & 0S/2; $53,800/yr, 40 hrs/wk. 8a-5p. Send resume to 7310 Woodward Ave., Room 415, Detroit, MI 48202. Ref. #23696 "Employer Paid Ad"

Get The Best of Both Worlds.



If you are looking for the challenges offered by a dynamic consulting company with the stability and opportunities of an industry leader, turn to SEI. For over a quarter century, SEI has provided cutting-edge solutions to Fortune 500 companies around the world. We have an extraordinary record of accomplishment in helping our clients build state-of-the-art information systems that are critical to their success. We seek dedicated professionals with 3+ years experience in a variety of disciplines, including:

- C/C++/UNIX
- Lotus Notes
- ORACLE, SYBASE, INFORMIX
- UNIX Administration
- PowerBuilder
- Data Warehousing
- Visual Basic
- SAS, SAP, Business Objects
- Project Management

What makes SEI different? We take a project approach to all of our consulting engagements. We organize and manage these projects in small, self-directed teams with a high level of involvement from every team member. And you will work in a variety of environments using the latest technology. All of our consultants are full-time employees who enjoy:

- Pay for Every Hour Worked
- Optional Travel Assignments
- A Complete Benefit Package
- Management Opportunities

If you're ready for the best of both worlds, send your resume to the location nearest you, or e-mail to: career102@sei-it.com. Make sure you visit our web page at: http://www.sei-it.com.

SEI information technology

Send resume to the attention of Rebecca Standen at:

Chicago
1301 W. 22nd Street
Oak Brook, IL 60521
Ph: 708-571-4380
Fax: 708-574-2557

Los Angeles
515 S. Figueroa St, Ste. 1050
Los Angeles, CA 90071-3301
Ph: 213-892-9075
Fax: 213-892-9088

New York
420 Lexington Ave., Ste. 2331
New York, NY 10170-0002
Ph: 212-557-0700
Fax: 212-557-0181

We are an Equal Opportunity Employer

Software Engineer for software co. in S. Ohio. Duties: Design and maintain new and existing software products, using C, Intel 8086, C++, and assembly programming, Object-oriented design, network protocols, including TCP/IP, FTP, and IPX and languages, graphic user interfaces in operating systems Windows 3.x, Windows 95, DOS, UNIX and X-Windows. Provide input into product architecture, design specifications and development time schedules. Coordinate product interoperability. Write source codes based on design specifications, research feasibility of new products/features and add new features as required by customer requests. Test new products before release and correct bugs. Conduct informal training on new product releases, participate in trade shows and in-house demonstrations. Requires: Bachelor's degree in Computer Science or Information Science or Mechanical or Electrical Engineering or Physics, and must include current or subsequent coursework, laboratory or project work, or research in the following areas: UNIX Operating Systems; Automata Theory; Compiler Writing; Algorithms; Graphical User Interfaces; Object-oriented programming in C and C++; Graphical Programming, which must have included Windows programming with Visual C++/MFC and X-Windows programming with OpenLook and Motif using TCP/IP, FTP, and IPX communication protocols; and the use of Windows, DOS, UNIX, VMS, and X-Windows operating systems on different platforms, including IBM PC series, HP, SunSparcs, and VAX. EOE. 40 hrs/wk; 8:00 a.m. to 5:00 p.m. Salary: $40,685/yr. Must have proof of legal authority to work indefinitely in the U.S. Send resume (no calls) to: Joyce B. Wolfe, Director, Human Resources, Attachmate Corporation, 8230 Montgomery Road, Cincinnati, OH 45236.

Systems Analyst - Client/Server Business Applications: Responsible for the full life-cycle development of client/server-based business application solutions to clients using RDBMS (MS-SOL Server 4.2, Oracle 7.0, Sybase 4.9), SOL*Forms, SQL* Reportwriter, SQL*Menu, PL/SQL & GUI front-end tools (PowerBuilder & Visual Basic). The types of business applications to be developed include financial, manufacturing, banking & insurance applications. Define user requirements & interact with users & higher-level information technology managers. Perform data modeling, database design, system development, implementation & knowledge transfer. Provide education & training services to clients engaged in or planning to engage in the migration to a client/server architecture. Perform requirements analysis, enterprise modeling, project and benchmarking metrics. Develop business process re-engineering strategies for clients. Must have Bachelor's degree in Computer Science or Business Administration. Must have two years of experience in the job oitered. Must have managed 3 on-the-job client/server-based projects which involved the design & development of a: Financial Planning System using RDBMS and PowerBuilder under a UNiX environment; Bank Guarantee System and Materials Management System under OS/2 Novell Netware environments using Oracle RDBMS. 40hrs/wk, 9:00am - 5:00p.m. $58,320/yr. Must have proof of legal authority to work permanently in the U.S. Send resumes to Illinois Department of Employment Security, 401 South State Street - 3 South, Chicago, IL 60605, Attn: BRENDA KELLY, Ref# V-IL-14162-K. NO CALLS. AN EMPLOYER PAID AD - SEND 2 COPIES OF BOTH RESUME & COVER LETTER.

TANDEM
COBOL, PATHWAY,TAL, SCOBOL,C, SQL,X.25
STRATUS
PL1,COBOL,C,ON/2
MUMPS UNIX
SUN, HP, RS/6000, GUI, SDK Powerbuilder, C++, Visual Basic
Fulltime/Consulting Positions available in the US/ABROAD
STRATEM
800-582-JOBS
TEL (212)967-2910
FAX (212)967-4205
124 W. 30th St. Suite #302
New York, N.Y.10001

SAP

We specialize in the placement of SAP professionals and hove over 300 openings worldwide for long term contracts and permanent positions. We have low overhead, so we can pay you TOP rates!

People Unlimited
1805 Sardis Rd. N. #103
Charlotte, NC 28270
Phone: 704-841-1135
Fax: 704-841-1173

COMPUTERWORLD
9th Annual
Campus Edition

Recruit top I.T. students from top I.T. Campuses!

Issue Date: Oct. 31, 1996
Close: Sept.18, 1996

Plan Now!
1-800-343-6474, x8201

DBS

DBS SYSTEMS CORPORATION

DBS Systems Corporation is a rapidly growing software development and systems integration company whose focus is providing high performance, high volume, transaction processing software solutions. Our specialization is in Subscriber Transaction Management software for Direct Broadcast Satellite Television, Multi Channel Pay TV and other industries which require an integrated software package to manage a large customer data base. We are searching for computer professionals having current experience with any of the following products:

Open VMS	Windows NT	Oracle RDB	ACMS
DECforms	Visual Basic	SQL	C

The following positions are available in Charlotte, North Carolina.

- Systems Architects
- Oracle RDB DBA
- Software Development Manager
- Quality Assurance Analyst
- VMS and NT System Managers
- Senior System Analyst
- VMS and NT System Programmer
- Production Operations Manager
- Release Engineers
- Windows NT VB Programmer
- Application Programmers & Programmer Analysts

For confidential consideration, please mail or fax your resume and salary history to: **DBS Systems Corporation, 9401 Arrowpoint Blvd., Suite 220, Charlotte, NC 28273; Fax: (704) 559-4949**

providing high performance, high volume, transaction processing software solutions

---

Technology Consulting, Inc. is a dynamic and rapidly growing Software Development Firm with challenging assignments ***NATIONWIDE.*** With over 300 systems specialists on staff, we are a leader in application outsourcing.

NEW PROJECTS

Client #1 Seeking individuals with Database experience to become part of team implementing Client/Server and developing new Methodologies. Positions include DBAs, Data Modelers, Data Analysts, and Methodologists. Excellent compensation, benefits, and relocation package.

Client #2: Seeking Object Oriented Developers, Systems Testers, Sybase Stored Procedures Developers and a Data Modeler with logical and physical database design. Environment includes C++, Visual Basic, Powerbuilder, and Sybase. Interactive Voice Response experience would be a plus.

Client #3: Seeking individuals with any one of the following: Oracle 7, Forms 4.5, Data Warehousing, Developer 2000, Case experience. These positions are in the manufacturing and entertainment industries.

TCI offers competitive salaries, attractive benefits, and relocation assistance. For consideration, send resume or call: **800-829-4824.**

Landing A New Job Can Be As Easy As Pushing A Button.

Call:
8 0 0
8 2 9
4 8 2 4

TCI TECHNOLOGY CONSULTING INC.

1800 Meidinger Tower,
Louisville, KY 40202 FAX: 502-589-3107
http://www.technologyconsulting.com

TRANSLINK *Outsourcing* INC.

Opportunities for experienced SAP consultants

- **Big Six**
- **Industry**
- **Permanent Placement/Contracting**
- **Regional & National**

Send resume and qualifications to:

fax: 215-283-3124
email: tlusa@translinkusa.com
web: www.translinkusa.com
telephone: 800-311-6200 • 215-283-3123

TIME TO BECOME A KEANE CONSULTANT

SOFTWARE PROFESSIONALS

You're in demand. So you want a company that will recognize and reward your experience, drive and abilities. Time to become a Keane consultant.

We're leading the IT outsourcing market with innovative solutions to our clients' business needs. To continue our success, we're seeking top-notch software professionals to assume hundreds of challenging career positions in locations across the country. Current opportunities include:

- *Mainframe Application Developers*
- *Client-Server Application Developers*
- *Systems Analysts*
- *Project Managers*
- *Network Engineers*
- *Software Testers*
- *Entry-Level Programmers*

Sales, Recruiting and Branch Management positions, as well as Technical Hourly Contract opportunities, also available.

Keane is a $400M software services company, providing project management, application development, and application and help desk outsourcing.

Fax your resume to:

Keane, Inc.
1-800-544-0157
Attn: Dept 601CW

Or mail a copy to our Corporate Headquarters. Please indicate a preferred location from the cities listed at right.

For hourly contract inquiries only, fax your resume to 1-800-544-0157 Attn: Dept 531AD.

Career opportunities with competitive salaries, benefits and training available in:

Albany, NY
Atlanta, GA
Austin, TX
Bedford, NH
Binghamton, NY
Boca Raton, FL
Boston, MA
Charlotte, NC
Chicago, IL
Cincinnati, OH
Clark, NJ
Cleveland, OH
Columbia, MD
Columbus, OH
Dallas, TX
Darien, CT
Denver, CO
Detroit, MI
Fairport, NY
Fishkill, NY
Grand Rapids, MI
Houston, TX
Los Angeles, CA
Louisville, KY
Milwaukee, WI
Minneapolis, MN
Montréal, Québec
New York, NY
North Haven, CT
Parkersburg, WV
Philadelphia, PA
Phoenix, AZ
Pittsfield, MA
Portland, ME
Raleigh-Durham, NC
Rochester, MN
Rochester, NY
Salt Lake City, UT
San Francisco, CA
San Jose, CA
Seattle, WA
Syracuse, NY
Tampa, FL
Toronto, Ontario
Washington, D.C.

Keane, Inc.
Corporate Headquarters
Ten City Square, Boston, MA 02129
617-241-9200
http://www.keane.com

An Equal Opportunity Employer, M/F/D/V.

KEANE

Celebrating 30 years of service to our clients.

These positions will be based in Boston, New York, Salt Lake City & Dallas.

IF YOU KNOW ANYTHING ABOUT FIDELITY INVESTMENTS®, YOU KNOW THAT STAYING ON THE **LEADING EDGE OF THE INDUSTRY** IS ONE OF OUR MOST IMPORTANT MISSIONS. IN FACT, **FIDELITY INVESTMENTS SYSTEMS COMPANY** IS ADVANCING OUR BUSINESS AND TECHNOLOGICAL OPERATIONS INTO AND BEYOND THE 21ST CENTURY. WE HAVE AN **IMMEDIATE NEED FOR TALENTED PROFESSIONALS** WITH EXPERIENCE IN SOFTWARE QUALITY TO HELP US GET THERE. **PARAMOUNT TO THIS MISSION IS THE QUALITY ASSURANCE GROUP.** THIS GROUP ENSURES THE QUALITY OF FIDELITY SYSTEMS COMPANY PRODUCTS AND SERVICES. THEY CONTINUALLY DEVELOP AND IMPROVE OUR SERVICE OPERATIONS AND PRODUCTS, RESULTING IN THE HIGHEST-QUALITY SOFTWARE DELIVERED TO OUR CUSTOMERS. **ARE YOU UP TO THE CHALLENGE OF PLAYING A STRATEGIC ROLE IN THE SUCCESS OF FIDELITY, THE WORLD'S LEADING MUTUAL FUND COMPANY?**

are YOU a Quality LEADER?

Job Code: CL931 Product Assurance Engineers

We need people with at least 3 years' experience in software development to understand and implement Fidelity Investments Systems Company standard processes for developing software products. You will develop quality and project plans and revise and update actual product performance against these plans; conduct verification and validation activities; document and track project issues; coordinate corporate internal audits, quality audits, and SEI audits; and prepare and support software-configuration-management plans. SQA experience is desired; strong analytical skills and a proven ability to work on multiple concurrent projects are essential.

Job Code: CL932 Process Assurance Engineers

We offer a variety of opportunities for Process-Assurance specialists to provide support for measurement, analysis, and improvement of FISC products and services. Responsibilities include independently auditing and reviewing capabilities consistent with CMM and quality standards; helping establish frameworks for metrics and analysis of products and services through the development lifecycle; and reporting project performance and SQA organizational information. At least 3 years' software-development experience involving software metrics, analysis, reporting, standards and policy development is essential.

Additional opportunities at Fidelity nationwide:
http://www.newjobs.com/fidelity

Fidelity Investments®

? to respond

Fax
1-800-343-1176
WHEN FAXING RESUMES, ALSO MAIL ORIGINAL TO ENSURE THAT YOUR RESUME CAN BE SCANNED INTO OUR NATIONAL DATABASE.

Internet
RESUMES@FMR.COM

Mail
FIDELITY INVESTMENTS
HUMAN RESOURCES
82 DEVONSHIRE STREET
SPECIFY JOB CODE
MAIL ZONE: A3B
BOSTON, MA 02109

= Opportunity

FIDELITY INVESTMENTS IS COMMITTED TO CREATING A DIVERSIFIED ENVIRONMENT AND PROUD TO BE AN EQUAL OPPORTUNITY EMPLOYER.

! Benefits

- THREE-PART CAPITAL ACCUMULATION PLAN WITH 401(K)
- COMPREHENSIVE HEALTH/DENTAL INSURANCE
- LIFE INSURANCE PROGRAM WITH INVESTMENT OPTIONS
- COMPANY-PAID PENSION PLAN

Choose Commitment... Choose CARA!

"If we treat our clients and consultants as we do our friends, we will enjoy a relationship based on respect and focused on customer satisfaction."

CARA Corporation is a professional consulting firm providing services to Fortune 500 companies and their subsidiaries. CARA–a Gaelic word meaning "friend"–embodies our business philosophy and is the primary reason we have grown consistently in staff and technical expertise.

CARA Corporation is committed to supporting our clients with high quality services provided by three divisions. Each division is structured to focus on specific business needs, yet frequently, divisions will work together to deliver the staffing solutions demanded by our clients.

Business Systems Division

- Analysis/Design
- Application Development
- Programming
- Implementation/Testing

Training Services Division

- Instructional Design
- Custom Training
- Technical Writing
- Documentation Support

Engineering and Scientific Systems Division

- Embedded Control Systems
- Windows, NT & '95 Development
- Digital Switching Systems
- Instrumentation & Data Acquisition

Salaried and contract positions exist for consultants who possess excellent communication skills and 3+ years of experience in the above areas.

Because we realize that our success is due to the effort and dedication of our staff, we provide a compensation package that is among the best in the industry. It includes profit sharing, a 50% matched 401k plan and medical/dental insurance. For more information, contact our Recruiters at the locations below. Please specify Division include *Dept. CW2/26* in you correspondence

125 S. Wacker Drive
Suite 300
Chicago, IL 60601
Phone: (312) 641-CARA (2272)
Fax: (312) 214-7037
Internet: cara@occ.com

1900 Spring Road, Suite 450
Oak Brook, IL 60521
Phone: (800) 645-CARA (2272)
Phone: (708) 990-CARA (2272)
Fax: (708) 368-2800
Internet: cara@occ.com

2122 East Highland Ave.
Suite 325
Phoenix, AZ 85016
Phone: (800) 257-CARA (2272)
Phone: (602) 224-6090
Fax: (602) 224-9097
Internet: betsy@caracorp.com

1750 112th Avenue N.E.
Suite C-242
Bellevue, WA 98004
Phone: (800) 255-CARA (2272)
Phone: (206) 462-0085
Fax: (206) 462-0229
Internet: cara@interserv.com

CARA CORPORATION

CARA Corporation 5 Years of Excellence

• CHICAGO • OAK BROOK • PHOENIX • SEATTLE

Lead Software Engineer for Options Exchange in UNIX, Windows, TCP/IP, SNA environment; develop, plan manage software developmt projects for Options Exchg Trading environment; write documentation, test plans, prepare manuals for operating procedures; responsible for UNIX sysadmin, TCP/IP config, perf tuning, ongoing prod support for mission critical apps; utilizing Sys V Device Drivers, Sys V Internals, Sys V Network Appl Programming. Must have 4 yrs college with BS in Comp Sci. Completion of UNIX courses involving Sys V internals, Sys Device Drivers, Sys V Network Appl Programming 3 yrs in job or 3 yrs as Project Manager reqd. 36.25 hour/week. 8:30am to 5pm. $59,000/yr. Must have proof of legal authority to work permanently in U.S. Send 2 copies of resume, cover letter to Illinois Department of Employment Security, 401 S. State St. - 3 South Chicago 60605. Attn: Mary Miltea, Reference #V-IL 13063-M, no calls. an employer paid ad.

Principal Consultant needed for computer consulting firm located in Houston, Texas. Job duties include managing a SAP software implementation project. Organize, plan, and control the teamwork. Will supervise from 5-10 team systems consultants. Project will be in the functional areas of sales and distribution, management, and customer management. Will use SAP, ABAP/4, SD/MM/PP modules, Natural, MRP, PRC, CRP, and Progress/4GL. 40 hrs./wk., 8:00 am - 5:00 pm, Mon-Fri, $100,000/yr. Applicant must have 3 yrs. exp. in the job duties listed above or 3 yrs. exp. as a Systems Analyst to include 3 yrs. as a SAP project implementation leader including the use of ABAP/4 and SD/MM/PP modules. Apply at the Texas Employment Commission, Houston, Texas or send resume to the Texas Employment Commission, TEC Building, Austin, Texas 78778, J.O, #TX7504268. AD PAID BY AN EQUAL OPPORTUNITY EMPLOYER.

Software Engineer, 40hrs/wk., 9am - 5pm, $48,000/yr. Design, develop, implement & test software for management information systems in a client/server environment using object-oriented techniques. Database design, data normalization & data model analysis. Database configuration & fine tuning. Graphical User Interface (GUI) development. Tools: ER win/ERX; MS-Windows; Access; Sybase SQL Server; Watcom SQL; ORACLE; Novell; Visual Basic; Powerbuilder. M.S. in Computer Science or Computer Management Information Systems as well as one year experience in job offered or as Research Assistant required. Previous experience must include: database design & fine tuning; GUI application development in client/server environment; object-oriented technology. Must have proof of legal authority to work permanently in the U.S. Send resume to: Utek, Inc., Attn: Jeff Fang, 915 Harger Rd., Ste. 350, Oakbrook, IL 60521, (708) 573-9888.

Utilize his knowledge of the banking industry, Tandem software and BASE24 software to solve ACI customers' Tandem and BASE24 related problems quickly and effectively. Design, develop, test, and install customer required changes to BASE24 software in an efficient manner. Provide expert knowledge and skill to perform tuning of Tandem software and BASE 24 software to maximize the performance of customer systems. Train the customer to best utilize BASE24 software. Prepare and make presentations to customers. Ability to perform consulting duties in an independent matter. Ability to manage a small team of software developers. Must have B/S, B/A in Engineering, MIS, Computers. 40 hours/week, $40,000.00/year. Must have proof of legal authority to work in the United States. Send your resume to Bernard Childerston, Nebraska Department of Labor, P.O. Box 94600, Lincoln, NE 68509. Refer to Job Order #NE 0156442. This advertisement is paid for by the employer.

LODGING SYSTEMS ANALYST - Evaluate Lodging Mgmt System for installation/enhancement of software/systems for Hotel operations. Liaise for Yield Mgmt, Unblocked Systems & Graphic User Interface Project. Coordinate, communicate changes/upgrades to users. Direct lodge housekeeping & maintenance. Req. Bachelor's in Comp. Sc. or Business Admin. & 1 yr exp in job or related EDP, Hotel/Recreation occupation. Exp must incl Hotel Reservations & Marketing System (LMS), AS/400, UNIX. $25,000/yr. 40hrs/wk. 9:00am-5:00pm. Job Site: Keystone, CO. Send resume to ATTN: Jim Shimada, Tower 2, Suite 400, 1515 Arapahoe St., Denver, CO 80202-2117. Attn: Job Order # CO 4461407

Programmer/Analyst (Will travel between Boca Raton and Miami, FL client sites). Analyze, design, develop, code, implement, test, and maintain commercial and financial applications systems using RPG/400 in an IBM AS/400 environment. Bachelor's Degree in Comp. Sci., Engin., or Math, + 2 yrs. exp. in job. $37,500/yr; 40 hr/wk; 9 a.m.-5 p.m. Send resume to: Job Service of Florida, 2660 West Oakland Park Blvd., Ft Lauderdale, FL 33311-1347, Re: JO# FL-1379298.

Programmer/Analyst (Will travel between Boca Raton and Miami, FL client sites). Analyze, design, develop, and implement programs for commercial and financial applications systems using RPG/400 in an IBM AS/400 environment. Bachelor's Degree in Comp. Sci., Engin., or Math, + 2 yrs. exp. in job. $37,500/yr; 40 hr/wk; 8:30 a.m.-5 p.m. Send resume to: Job Service of Florida, 2660 West Oakland Park Blvd., Ft Lauderdale, FL 33311-1347, Re: JO# FL-1380006.

Systems Analyst - client sites & Co. loc in Boca Raton, FL. Analyze, design & develop applications. Provide technical support for OS/2 using ASKQ, Retain, VM, Buffer, LOTUS NOTES, Communication Manager on PC based systems. Bachelors/Comp. Sci, Math or Engg. 2yrs/exp. in job offered or 2yrs as Systems & Network Support Analyst &/or Cons. &/or Prog. Exp. in job offered or related occ must incl. 6mos using OS/2, ASKQ, Retain, VM, Buffer, LOTUS NOTES, Communication Manager on PC based systems. Exp. may be concurrent. 40hrs/wk (8-5; M-F). $37,150/yr. Send resume to: Job Service of Florida, 2660 W. Oakland Park Blvd., Fort Lauderdale, FL 33311-1347, Re: Job order number FL-1379078.

Issue Date: June, 1996
Close : April 17, 1996

Reserve your place in Computerworld's Best Places to Work Magazine!

1-800-343-6474 x8201

On-Line Resources, Inc. *is a rapidly growing consulting company providing software consulting services to clients nation-wide. We have openings at locations throughout the US. We are looking for Systems/Analysts and Programmer/Analysts with Bachelors degree in Math/Computer Science/any Engineering and with 2 years experience in any of following sets of skills:*

- ***DB2, CICS, COBOL***
- ***DB2, CICS, COBOL, ADW***
- ***DB2, CICS, COBOL, IEF***
- ***ORACLE, FORMS, REPORTWRITER***
- ***AS/400, RPG/400***
- ***VISUALBASIC, SQL-SERVER/MS-ACCESS***
- ***UNIX/DOS/WINDOWS Internals***

Please send resumes to:

On-Line Resources, Inc.
2170 W SR 434, Ste 220
Longwood, FL 32779
Fax: (407) 869-8346
E-Mail: 74362.2570@compuserve.com

On-Line Resources, Inc.

---

www.dice.com

DICE is looking for Data Processing, Engineering and Technical Writing professionals to fill open positions for companies nationwide.

DICE is a FREE online job search service, providing detailed information about current contract and fulltime positions across the USA. Please contact by calling ANY of these access numbers, using your computer & 1200-9600 baud Modem, 8-N-1.

California	408-737-9339
Georgia	404-523-1341
Illinois	708-782-0960
Iowa	515-280-3423
Massachusetts	617-266-1080
New Jersey	201-242-4166
Texas	214-691-3420
Internet	telnet dice.com
Web	www.dice.com

DATA PROCESSING
INDEPENDENT
CONSULTANT'S
EXCHANGE

A Service of D&L Online, Inc:. (515) 280-1144

SYSTEMS PROGRAMMER II

GUILFORD COUNTY GOVERNMENT
GREENSBORO, NORTH CAROLINA

Seeking a Systems Programmer II to install, maintain and tune CICS, DB2, and IMS system software on an IBM 9672-R21 mainframe running MVS/ESA. Duties include DBA functions, problem determination and resolution and technical support. Currently converting to CICS 3.3, DB2 3.1, IMS 4.1 and MVS 5.2. Experience with Oracle in a client-server environment desired. Requires a Bachelor's degree in Computer Science or related field and 2 to 3 years related experience, or an equivalent combination of education and experience.

Annual salary range: $39,708 - $59,148. Requires a Guilford County application supplemented with a resume to include salary requirements. For application call (910) 373-3324 or (910) 373-3892. EEO/AA

ATTENTION CONTRACTORS!

Add your resume information to the Discovery Database and let all the consulting companies that are looking for your skillsets come to you. Assignments and/or positions are available nationwide for absolutely all skillsets. **And it costs you absolutely nothing!** If you want the added advantage, mail or fax your resume to:

The Discovery System

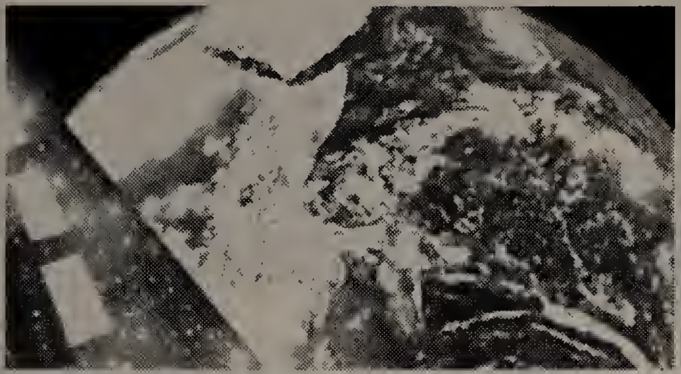
P.O. Box 37075
Kansas City, Mo. 64138

FAX (800) 505-6293
Voice (800) 222-0751

Assignments: Contract W2 • Contract 1099 • Contract for Hire • Permanent Placement

Positions: Applications Programmer • Database Administrator • Network Administrator • Programmer/Analyst • Systems Analyst • Systems Programmer • Team/Project Leader • Technical Writer

---



WE'RE EXTENDING THE BOUNDARIES OF THE LEADING EDGE...

...And now you can be part of the excitement!

Join us at our Corporate Headquarters located in the sunny Greater Miami area, just a short drive from the Florida Keys! Enjoy year-round recreation such as four major league teams, star-quality performing arts and theater, five-star restaurants, and the country's finest beaches. For innovative logistics, transportation and distribution solutions, Business America depends on $5-billion Ryder System, a Fortune 250 leader. And, as an organization, we depend on the outstanding talents of our respected team of MIS professionals. We provide them with the very latest tools - IBM mainframe systems, AS/400 and RS/6000 platforms, client/server technologies, networked communications, to name only a few - and give them the freedom to create the solutions of tomorrow. It's an engaging, enriching environment, ideal for achievers seeking new challenges. If that's you, consider one of these immediate openings.

All of the following positions require a high level of proficiency, BS/BA (MBA or MS preferred) or equivalent work experience, and excellent verbal/written communication skills.

Technical Product Manager

You will manage and ensure day-to-day operational readiness of RS/6000 based systems and coordinate all resources for project/system implementation & problem resolution. A minimum of 5 years in management along with MIS operation management & customer management/interface experience are required. RS/6000 - UNIX knowledge preferred. JOB CODE 950496

Sr. Technical Project Manager

You will be responsible for technical project planning, coordination & control, project issues resolution/escalation, project status reporting and vendor management. At least 10 years total MIS experience, 5 years technical project management experience and some applications & technical background are required. Strong communication, technical project planning and project control skills are needed. Good understanding of technical environment is a must. JOB CODE 950498

Network Support Experts

For these senior-level positions, we seek highly motivated network technologists with expert skills and extensive experience related to Cisco routers, Ethernet, and Token Ring. Solid network troubleshooting and support experience with routing and hub technologies in a multi-protocol WAN/LAN environment is required. Other necessary skills include expertise in Sniffer, TCP/IP, IPX, and Frame Relay. Background in the use of SNMP-based network management tools and switching technology is preferred. Working with other network support staff, these positions will have responsibility for production support of our entire network infrastructure. JOB CODE 960518

Mainframe Systems Programmer

Senior systems programmer to install, maintain and tune CICS, VTAM, and other program products. In-depth CICS experience with VTAM background required. SMP/E with solid program product experience a must. TCP/IP, Assembler preferred. Cobol, NetView, Omegamon, APPN a plus. Must be a team player able to work in a fast-paced, multi-platform business environment. JOB CODE 950352

Principal Computer Systems Designer

You will be involved in the release/distribution process and participate in the department of new delivery management systems facilities. You will also be responsible for the design, development & install support applications in an AS/400 distributed network and identifying and implementing short/long term solutions to productions problem related to the software delivery/distribution process. Qualifications include a strong design, programming and testing background, 5+ years experience in COBOL/RPG programming and working experience with CL AS/400. Strong working knowledge of the FIS environment, along with experience in software change control, AS/400 DASD management and AS/400 security management are also required Previous Ryder experience in a project leader role is preferred. JOB CODE 95048

Principal Business Systems Designer

Under minimal direction, you will be responsible for applications development projects which meet the MIS business needs and for full lifecycle development projects for MIS with emphasis on analysis activities. You will work closely with other MIS personnel to determine business needs and provide effective business solutions. Qualifications include 5+ years experience in application development, concentration in business analysis and proficiency in the use of upper CASE tools with experience using ADW. JOB CODE 960533

Systems Assurance Analyst

You will obtain and maintain a thorough understanding of the Field Information System and Ryder PC applications through regular review of documentation, interaction with MIS development personnel, field visits and organized in-house training. Qualifications include at least 5 years direct experience with business system in either a development or user capacity, excellent analytical & communication skills and the ability to work in a dynamic, fluid environment. Preferred 2 years direct experience in quality assurance or software development capacity. JOB CODE 960353

Principal Business System Designer

Responsible for project leadership of full-life cycle development for integrated PC/laptop based client/server, DSS/EIS system for use by Ryder Dedicated Logistics' management and external customers. At least 8 years developing business systems, 5 years DSS/EIS development background, and 3 years in a client/server environment are required. Proficiency in PC, Excel and Word needed. Strong project leadership, planning, estimating, analytical and consulting skills are essential. Logistics business and systems experience preferred. JOB CODE 950455

Sr. Systems Assurance Analyst

You will work with the MIS Development, System Assurance, Systems Delivery & Change Management groups & Project Office to assist in the definition of the MIS Quality Assurance process, documentation & implementation of the process throughout the organization. Qualifications include strong background in systems analysis, planning & design, at least 5 years experience in information systems with a thorough knowledge of systems development methodology and experience in software evaluation and selection processes. JOB CODE 960536

Principal Technologist - Lotus Notes

You will provide Level II/III support for the Lotus Notes infrastructure, and develop and implement associated servers and hardware. Qualifications include at least 3 years Lotus Notes support and services experience in a large computing environment and background in OS/2, Token Ring, and Ethernet. JOB CODE 950354

Project Leader

This individual will be a resident in the Greater Nashville, TN area and act as primary liaison between RDL Information Systems and the local RDL operations team. You will also interface with External customers as needed, represent RDL/MIS and assist in performance of systems analysis and design. Strong interpersonal skills and a good mix of systems, Business and technical skills along with customer focus attitude are imperative. At least 3 years experience in application development, implementation and project leader and experience in project management of very large, cross functional information systems projects are required. JOB CODE 950410

We offer highly competitive compensation, full-featured benefits, and excellent growth potential. For consideration, please forward resume with salary requirements to: Human Resources, Dept. PG-(indicate job code from above), Ryder System, Inc., 3600 NW 82nd Ave., Miami, FL 33166. *For more details about our dynamic company, see our Internet Home Page at http://www.ryder.inter.net/ryder*

RYDER

An EOE. Drug testing is a condition of employment with Ryder.

TRAVELING DBA'S
Software vendor. DB2 DBA to work with clients on DB2 products

OUTSOURCE MANAGERS
Requires exp. managing outsourced programmers.

DEVELOPMENT MANAGER
Software vendor wants first line manager with exp. bringing software products to market.

UNIX SYS ADMIN
1+ yr AIX or HPUX, SUN or SCO.

SYSTEM ANALYST
4+ years BIG 6 experience.

SYSTEMS PROGRAMMERS
MVS or CICS or DB2 or VTAM.

DASD MANAGERS
5+ yrs DASD MGT, several locations.

QUALITY ASSURANCE
Testing or QA exp. DB2 or UNIX a+.

ORACLE DBA'S & P/A'S
Contract & permanent jobs throughout the U.S.

C++ PROGRAMMERS
1+ year C++ development exp.

SOFTWARE DEVELOPERS
A variety of positions with vendors developing mainframe, PC and UNIX platform software. Skills desired include ALC, WINDOWS SDK, C, C++, DB2, Oracle or Sybase.

PROGRAMMER/ANALYSTS
HP 3000, Cobol, Powerhouse
IBM MVS Cobol
AS400 RPG; SYNON a plus
LIFE INSURANCE
IBM PC COBOL

CONTRACT JOBS
WINDOWS SDK
INFORMIX DBA
MVS, ALC, INTERNALS

ROBERT SHIELDS & ASSOCIATES
PO Box 890723, Houston, TX 77289-0723
800-423-5383 • Fax 713/486-1496 • email: ITJOBS@AOL.COM

CONSULTANTS

Immediate Interviews

MAINFRAME

DB2/CICS
DB2 or CICS
Natural 2
AS 400
ADW or IEF
BAL
EDI

- Focus
- IDMS
- Internals
- CASE
- CSP
- HPS
- QMF

- ADSO
- IMS
- Ideal
- Tandem
- VAX/COBOL
- PL1
- SAP

CLIENT SERVER

Lotus Notes
PeopleSoft
Smalltalk
Oracle
Lan/Wan
Gupta
Sys/Admins
Powerbuilder
Win NT or 95

- Informix
- Visual C++
- Novell
- Unix
- Sybase
- Access
- TCP/IP
- WWW
- SAP

- C or C++
- Device Drvrs
- Testing
- Vis Basic
- Pick/OS
- HTML
- OOA/OOD
- Windows
- MF/Cobol

Rohn Rogers Consulting
Attn: Roger Sichel
1212 6th Ave, 9th Fl, **NYC** 10036
800-421-5158 212-921-1319
Fax 212-302-4363
email: 00801@psilink.com
or R. Michaels
550 No. Reo St., Suite 300
Tampa, FL 33609-1013
813-287-5034 Fax 813-287-5179

Logistics Management Inc., Memphis, TN · the leader at consolidating warehouse, repair, inventory and information systems for manufacturers of computers and electronics equipment, seeks I.S. professionals to staff a client/server development project for the Unix environment.

APPLICATION DEVELOPERS

The ideal candidates should possess 2 yrs. experience in a Pick, Advanced Revelation, or Unidata environment, strong design and coding skills, and a general BA or BS. Candidates who are proficient with Advanced Revelation or the 'C' language for Unix are preferred.

The positions require working closely with end users, developing business data and process models, and defining overall systems requirements.

Qualified candidates must be customer service oriented with good oral and written communication skills.

Please submit resume and salary history to:

Director, H.R.
LMI
6269 E. Shelby Dr., Memphis, TN 38141
Fax: 901-541-2444
internet address: 2073468@mcimail.com

EOE/M/F/D/V

World-Class Clients. Ambitious Professionals.

IT PROFESSIONALS

What can Quantum Information Resources (QIR) offer you as a member of our staff? Challenging IT projects with some of the world's most prominent companies. A key role on a team of ambitious professionals who want exceptional careers. Long and short-term challenges helping us meet the needs of top corporate clients. If this is what you're seeking in your career, make the move to QIR. You'll find more than a great place to live, work and explore. You'll discover an employer which offers you access to training opportunities designed to strengthen your credentials and which provides you with a supportive management team that considers your job satisfaction as important as its clients'.

For more than 25 years, QIR has provided innovative and complex business solutions to large Fortune 500 companies. Our rapid growth has created immediate openings in **New Jersey**, **Philadelphia**, **Atlanta**, **Orlando** and **Dallas**, for Programmer/Analysts with one or more of the following:

COBOL, CICS, IMS DB/DC, DB2
C, UNIX, INFORMIX
POWERBUILDER, VISUAL BASIC, RDBMS

We meet the demands of both.

As a member of the Quantum team, qualified candidates will receive a competitive salary and excellent benefits, including major medical/dental/life insurance, tuition reimbursement, 401(k) plan, and travel and relocation expenses where applicable. To take advantage of this exceptional opportunity, please call or fax your resume in confidence to:

Bill Turner, Senior Corporate Recruiter
Tel: 1-800-274-7004; (908) 636-8666 Fax: (908) 602-9009
QUANTUM INFORMATION RESOURCES, INC.
Suite 190, Metropolitan Corporate Plaza,
485F Route 1 South, Iselin, New Jersey 08830

► **PLEASE NOTE:** Additional opportunities have just arisen for:

3 RPG 400 P/As

1 TECHNICAL WRITER

quantum
INFORMATION RESOURCES INC.

EOE

TORONTO • OTTAWA • MONTREAL • QUEBEC • NEW JERSEY • PHILADELPHIA • ATLANTA

SAN FRANCISCO BOISE LAS VEGAS MINNEAPOLIS PHOENIX PORTLAND RENO SACRAMENTO SALT LAKE CITY

BEST Consulting, one of the largest information technology consulting firms west of the Mississippi, employs 800 consultants in 11 branch offices and 2 outsourcing centers. Ranked among Washington CEO magazine's top 10 technology firms, BEST now serves many successful companies, including Microsoft, AT&T Wireless Services, American Express, IBM, GTE and Boise Cascade.

BEST provides systems integration, management consulting and outsourcing through NewTec Consulting, a division of BEST and contract services through it's branch offices.

BEST rapid growth has been based on the vision of earning the right to be business partners with its clients by exceeding expectations and, not only adding value but creating value.

BEST dynamic growth and expansion provides opportunities for a full range of needs in the Client Server and Mainframe areas. Please forward your resume to the branch location you are most interested in working with. Please forward your resume to the address below and indicate the office or offices your are most interested in.

BEST Consulting
12910 Totem Lake Blvd.Suite 270
Kirland, WA 98034
Phone: 206.814.8104 Fax: 206.814.8108
Dept. CW022696

A partial list of openings include:

•Project Managers •Business Analysts •Software Engineers Developers•C,C++•MFC•OLE•DBA's•Oracle•Sybase•SQLServer •Mainframe•Midrange•Client Server• RDBMS•DB2 •Powerbuilder Developers • ORACLE Applications experience tools and database• ORACLE Web Server experience

Microsoft SOLUTION PROVIDER NEWTEC CONSULTING BEST CONSULTING

SAN FRANCISCO BOISE LAS VEGAS MINNEAPOLIS PHOENIX PORTLAND RENO SACRAMENTO SALT LAKE CITY

Application Systems Analyst to design and develop computer-based systems for pharmaceutical product development by working closely with research and development department personnel. Design and develop engineering systems prototypes of complex scientific and/or technical applications and interacting with potential users in pre-clinical development departments, as well as working with preclinical development systems management. Utilize knowledge of chemical engineering processes and methodologies to maintain and validate Provox system software, including working directly with chemical engineers to resolve applications problems and train users. Use CAD software to produce engineering designs and integrate such designs into chemical engineering software applications for use by production and R&D. Analyze current applications systems and recommend enhancements, including migrating across database and/or operating systems to achieve optimal output. Use VisualBasic, FoxPro, Access and LISP. Applicants must possess Master of Science degree in Industrial Engineering Design or Computer Engineering Design plus three years of experience in the job offered or three years as a Systems Consultant and/or Systems Analyst or any combination thereof. Applicants must possess Bachelor's degree in Chemical Engineering and have gained experience in each of the following areas: design and development of engineering systems prototypes; use of CAD software to produce engineering drawings; and software development for medical and/or pharmaceutical end-use automation. Courses required in chemical engineering thermodynamics and advanced chemical analysis. 40 hours M-F, 8 a.m. to 4:30 p.m., $42,000/annum. Must have proof of legal authority to work permanently in the U.S. Send 2 copies of both resume and cover letter to: Illinois Department of Employment Security, 401 S. State St., 3 South, Chicago, IL 60605, Attn: Dennis Jones, Reference V-IL-13908-D. An Employer Paid Ad. NO CALLS.

Member of Technical Staff-Software Development. Perform software development, design, analysis, testing & documentation for telecommunications form. Write distributed application management strategy document & template, message logging & alarm text writing, testing & integrating application with OPO. Generate Alarm Attribute Files with Unique Alarm IDS & write help text for Alarms. Define software release management procedure. REOUIRES: Masters in Computer Science plus one year experience in software development, design & testing. Must have (1) working knowledge of UNIX terminal emulator & multiple window GUI based graphical editors (2) working knowledge of C++ & UNIX (all flavors) & Windows (3) working knowledge of distributed network application, TCP/IP & object oriented programming (4) working knowledge of X-Window & SQL/database programming. LOCATION: Denver, CO. WORKING CONDITIONS: 40hrs/wk, 8-5 M-F, $43,200/year. Reply by resume only to Colorado Department of Labor and Employment, Employment Programs, ATTN: Jim Shimada, Tower 2, Suite 400, 1515 Arapahoe Street, Denver, CO 80202-2117 and refer to job order number CO 4461677.

Systems Engineer, 40hrs/wk., 8am - 5pm, $42,000/yr. Design, implement, configure & administer Local & Wide Area Networks. Design, implement & administer UNIX-based SAP system, running Informix or Oracle database; code development in ABAP; design & implement communication architecture for SAP. Systems & applications programming. Document system & train users. Tools: DOS/Windows; UNIX; Novell; OSI; TCP/IP; C/C++/Visual C++; PowerBuilder; ABAP; IBMPC; HP/SUN workstation; Unix Shell Script. B.S. in Computer Science or Electrical Engineering as well as one year experience in job offered or as Project Engineer required. Previous experience must include: designing hardware systems; installing & administering Novell & Unix networks; OSI; TCP/IP; firmware development; software design & development. Education must include: database design; routers/bridges. Job located in Englewood, CO. Must have proof of legal authority to work in the U.S. Application is by resume only. Mail resume to: Colorado Dept. of Labor & Employment, Employment Programs, ATTN: Jim Shimada, Tower 2, Suite 400, 1515 Arapahoe St., Denver, CO 80202-2117, refer to order # CO 4461568.

Engineer, Senior Software. Resrch & devlp innovative, state-of-the-art s/w & progrmng lang based on C++ & LISP codes. Dvlp new s/w tools using CORBA. Devlp compilers. Devlp new s/w systms & progrmng lang using object-oriented progrmng desgn methdlgs & principles. Review s/w desgn & codes to ensure they meet s/w specs. Assist custmrs re use of s/w. Productize existng s/w. Mst hv Phd (or foreign equivlnt) in Comp Scie. Work exp or PhD work must have provided hands-on exp in: s/w dev't using C++; devlpng s/w using object oriented dsgn methdlgs & princpls; devlpng compilers; s/w dev't using LISP. $72,000/yr; 40 hrs/wk, job site & intrvw: Palo Alto, CA. Oual applcnts send res to: AD#069251GP, S. Chapman, 530 Lytton Avenue, Suite 301, Palo Alto, CA 94301. Prf of auth to wrk in US req if hired. Company is an Eq Opp empl and fully spprts affirm action prctics.

Programmer/Analyst (Will travel between Boca Raton and Miami, FL client sites). Analyze, design, and develop software systems using SQL Windows (GUPTA) under a relational database technology in a client server environment. Bachelor's Degree in Comp. Sci., Engin., or Math + 1 yr. exp. in job, or will accept 3 yrs. exp. in lieu of Bachelor's and 1 yr. exp. $40,000/yr; 35 hr/wk; 9 a.m.-5 p.m. Send resume to: Job Service of Florida, 2660 West Oakland Park Blvd., Ft Lauderdale, FL 33311-1347, Re: JO# FL-1380029.

Reserve your place in Computerworld's Best Places to Work Magazine!

COMPUTERWORLD
The 100-Best Places to Work
Ranking the Best in the Business:
• IS Growth • Benefits
• Training • Diversity

Issue Date: June, 1996
Close : April 17, 1996

1-800-343-6474 x8201

Programmer Analyst: plans, develops, tests and documents computer applications/systems, applying knowledge of full project life cycle, programming techniques, and computer systems. Evaluates user requests for new or modified programs and processes, such as for financial or human resources management systems, clinical research, telecommunications or point-of-sale, to determine feasibility, cost and time required. Consults with user to identify current operating procedures and clarify program/process objectives. Uses object-oriented techniques to design and develop processes. Prepares process models and diagrams. Performs data modeling normalization, and physical design of data structures. Designs user interfaces in both character and graphical based environments. Converts project specifications into detailed specifications, applying knowledge of computer programming techniques and computer languages. Tests and runs programs/processes. Detects syntax or logic errors during program test, using diagnostics software to detect errors. Itemizes program/process operating efficiency. Writes user documents to describe program development, logic, coding and corrections. Writes manuals for users to describe installation and operating procedures. Recreates steps taken by users to locate source of problem and rewrites program to correct errors. Uses software tools for data design, process design, and code generation. Trains users to use new program/process. Provides technical assistance to program/process users. Monitors performance of program/process after implementation, performing tuning based on results. May oversee installation of hardware and software. May install end test software at user site. May perform prototyping and iterative development using prototypes. Uses SUN SPARC and IBM hardware, UNIX Solaris, MS-DOS and Novell Netware operating environments. Programming/development uses C, C++, X-Windows, Xlib, Xview, Motif, GUIDE, Openlook, Visual Basic, OWL, Actor, COBOL and MS-Windows SDK. Must have a Bachelor of Science in Computer Science with two years of experience as Programmer Analyst or two years of experience as Programmer and/or Systems Analyst or any combination thereof. Experience must have included programming for financial systems within SUN Sparc environment on Solaris operating platform using C++, X-Windows, Xlib, Guide, and OpenLook (or OpenWindows). 40 hours M/F, 9:00 a.m, to 5:00p.m.; $55,000 per annum. Send resume to: Job Service of Florida, 2312 GULF-TO-BAY BLVD., PO BOX C, CLEARWATER FL 34618-4090. Re: Job order number FL-1361252.

Manager of Information System Technology to direct and coordinate development and production activities of data processing department including hands on maintenance of multiple file servers through local and wide area networks including Netware 2.15, 2.2, 2.11, 3.12, SCO Unix and Unixware; hands on maintenance and configuration of T1 multiplexers, remote routers and bridges; manage a ROLM PBX and key systems for integration into the voice and data wide area network: install, maintain, and customize ACCPAC Plus and MISYS manufacturing software to create automated financial and manufacturing statements; integrate Lotus 123 and Dynaview to consolidate financials using foreign exchange; manage a centralized communication billing using the billing edge software; develop custom databases in Paradox and Foxpro to track sales contracts and purchase orders and enhance inventory control; provide technical support to users in Spanish for all of the programs above at the Mexican operations. Travel throughout the US and World is required approx. 50% of the time. Require Bach. in Info. System Tech. Will accept exp. deemed equivalent to the required degree by a recognized credential evaluation service in lieu of degree. Require 2 yrs exp. as a Systems Support Manager which includes installation and configuration of ACCPAC financials, including MISYS, and technical support for Novell Netware, ACCPAC, MISYS, the General Store, Lotus, and Wordperfect. Must be fluent in Spanish. 45 hr. wk. 8am-5pm. $47,840/yr. Send resume to Job Service of Florida, 1001 Executive Center Drive, Orlando, FL 32803-3520, Job Order #FL-1378964

PROGRAMMER/ ANALYSTS

HEAT UP YOUR PROGRAMMING CAREER AT CHC IN SOUTH FLORIDA

Computer Horizons Corp., a leader in systems development, client server technology, and total project solutions, continues to be involved with many long term projects. We provide cutting edge solutions to our clients through a growing national network of 35 offices.

We have immediate needs for experienced professionals that require two or more years of experience with any of the following skills:

- **SR. P/A COBOL CICS DB2**
- **HP UNIX SYSTEMS ADMINISTRATORS**
- **ORACLE DBA**
- **AS400 RPG**
- **SR. P/A COBOL II, CICS (IDMS a plus)**
- **SR. P/A IDMS ADS/O**
- **SR. P/A Gentran EDI/COBOL 400/CL**
- **P/A COGNOS SPECIALIST**
- **P/A COBOL 400-CL**
- **SR. BUSINESS ANALYST WITH DATA ADMINISTRATION EXPERTISE**
- **P/A ADABAS NATURAL**
- **SR. P/A POWERBUILDER**
- **SR. P/A COBOL II, DB2, IMS DB/DC**
- **LOTUS NOTES ADMINISTRATOR**
- **LOTUS NOTES DEVELOPER, OS2 REXX, C**

We offer a highly competitive compensation and benefits package. To learn more, please fax, send or e-mail your resume to: **Ms. Rosalind Silk, COMPUTER HORIZONS CORP., 1291 SW 29th Avenue, Pompano Beach, FL 33069 Fax: 954-974-2470 E-mail chc31@aol.com**

Computer Horizons Corp.
An Equal Opportunity Employer M/F

WHO'S BUILDING A DIGITAL FUTURE? JUST ASK MICROSOFT.

That's right. Microsoft®, a leading provider of unbeatable software solutions knows all about being on top - and how to stay there. Fact is, they've chosen Digital to join in an enterprise-wide strategic alliance. Why? Well, there's our unparalleled multivendor service network, linking more than 28,000 professionals around the world. Our vast experience creating networking solutions for businesses. Our untouchable 64-bit technology. And our reputation as the world's largest supplier of Microsoft training, to name a few. Excited? You bet we are. Because when two powerful, innovative high-tech companies get together, the most important question isn't "why". It's "how" – as in "how can I get involved?" And the answer could change your life.

ACCOUNTS BUSINESS UNIT

Microsoft Consultants (Entry to Senior - Level)

You will be responsible for a full range of desktop consulting services to clients including GUI development and Microsoft BackOffice Suite. To qualify, you must have Microsoft Solution Development (MSSD) certification or be 50% certified, experience in PC development in a distributed client/server environment, and knowledge of Windows NT, Visual C++, Visual BASIC, graphic design and database. Additionally, individuals with Microsoft System Engineer (MSSE) certification or 50% certified and experience supporting large NT systems/networks, and knowledge of TCP/IP and SQL Servers will also be considered.

Positions are located in: Boston, MA; Hartford, CT; Providence, RI; New York, NY; Piscataway, NJ; Cherry Hill, NJ; Philadelphia, PA; Pittsburgh, PA; Albany, NY; Rochester, NY; Baltimore, MD; Washington, DC; Fairfax, VA; Richmond, VA; Raleigh-Durham, NC; Orlando, FL; St. Louis, MO; Milwaukee, WI; Detroit, MI; Columbus, OH; Cleveland, OH; San Jose, CA; Santa Clara, CA; Sunnyvale, CA; Cupertino, CA; Dallas, TX; Houston, TX; Denver, CO; and Seattle, WA.

digital™

Digital offers competitive salaries and full benefits including a generous relocation package. Please send your resume to: Digital Equipment Corporation, Attn: Staffing Manager, Dept. 009 MSO, 111 Powdermill Road, Mail Stop: MS02-1/E12, Maynard, MA 01754-1499. Fax: 508-493-8292 or e-mail: jobs-us-systemsintegration@digital.com See us on the World Wide Web: www.digital.com/info/careers We are an Equal Employment Opportunity employer.

© Copyright Digital Equipment Corporation 1996. Trademarks appearing herein are the property of their respective owners

---

Programmer/Analyst (Houston, TX area client site) Responsible for program development, systems conversion, software installation, maintenance, and support of AS/400 systems. Bachelor's in Comp. Sci., Engineering, or Math and 2 yr. exp. req., or will accept 4 yrs. exp. in job in lieu of Bachelor's degree and 2 yrs. exp. 40 hrs/wk, 9:00 - 5:00, $36,860/yr. Apply at the Texas Employment Commission, Houston, TX, or send resume to the Texas Employment Commission, TEC Building, Austin, TX 78778, J.O. #TX7505263. Ad Paid by an Equal Opportunity Employer.

Windows NT opportunities across the US

For details on the hottest permanent and consulting opportunities Fax resume and Call Stacy at CMS Inc.

Phone# 212-627-7044
Fax# 1-800-421-1644

PROJECT MANAGER

The **MBL Group** represents an Oregon organization with regional presence that is seeking a leader for a complex systems implementation. This major project offers a challenging oppty. for an experienced bus. leader in the areas of IS technology & strategic planning. The project involves the organizational re-engineering of business & information systems. Resp. will include leading implementation efforts & identifying strategic breakthroughs & mid-course corrections to achieve timelines with desired results. The organization operates in a values-driven, team-based environment, supportive of employee contributions. **Competitive salary & excellent benefits. AA/EEO employer committed to a diverse workforce. Requirements:** 6+ years in mngmnt. with exp. leading strategic business systems changes in lg. companies with complex information systems & processes. Proven ability to implement change for organizational success in a service environment. Mngmnt. of systems or process projects over $20 Million

Send resume, cover letter & compensation history to:

Susan Holloway at
MBL Group, Inc.
522 SW Fifth Ave., Ste. 1100
Portland, OR 97204
fax (503) 224-6707.
Email mbl@teleport.com.

NATIONWIDE CONTRACT & PERM. OPPORTUNITIES SAUDI ARABIA CONTRACTS!

EN-DATA CORPORATION is currently recruiting I.S. pros for contract and perm positions. The following is a small listing of available positions:

- **Integral Payroll (COBOL Batch)** Atlanta (10 month contract)
- **Tesseract HR/PR**
- **Dun & Bradstreet's M & E Series (M&D or MSA), Smartstream/Client Server a + -** Consult & Perm, Functional & Technical - all modules exp. (St. Louis, Tampa, Coral Gables, Dallas, Atlanta, Manhattan, New Orleans, Minneapolis Perm.)
- **PeopleSoft** - Perm & Consult - Texas, NYC
- Houston- Perm & Consult., **P/A's, Functional Analyst, Project Mgr., Team Leader, Lead Analyst, DBA's etc.**
- **Integral HR/PR, COBOL/CSP/ DB2, Endevor**
- **CICS/DB2 P/A,** Lawson a plus, PR exp.
- **Oracle or Sybase DBA's**

Saudi Arabia - Documentation Specialists, Clipper/Power-Builder, Microsoft, Dbase IV, Help Desk, Year 2000 [illegible], Endevor/IMS/DB/DC, Telon.

Join the winning team
by contacting:

En-Data Corp., P.O. Box 2949
Sanford, FL 32772-2949
Ph: (407) 323-0033
Fax (407) 323-0685
AOL:ENDATA1

The success of Science Applications International Corporation (SAIC) is fueled by the over 20,000 idea-driven employees who own it. And we're showing no signs of slowing down. Multiple openings exist for software development professionals with experience in the following

IEF DEVELOPERS

SAIC has won major contract awards to supply IEF development services for a large, long-term commercial project and various government agencies. Openings exist for professionals with all levels of IEF experience and provides the opportunity for local positions, travel possibilities, or relocation. We are hiring salaried employees and hourly contractors. For immediate consideration, please call **Pepper Casey at 703-318-4719.** Resumes may either be faxed to **703-709-1042**, or E-mailed to **p_casey@arlington01.saic.com.**

X-WINDOWS & MOTIF COBOL/ IDMS DEVELOPERS

SAIC has several openings for Software Engineers, Programmers/Analysts and Business Analysts in Ogden, Utah. Performing requirements analysis, facilitation, data modeling, Windows/GUI based systems design. Positions involve the design, programming, related testing and maintenance of applications using C and X-Windows/MOTIF and Oracle in a UNIX, client/server environment. COBOL/IDMS developers on IBM & Unisys platforms. For immediate consideration, please call **CJ Shafer at 703-318-4640** or E-mail your resume to **cj_shafer@arlington01.saic.com.**

Most positions require a BS or MS in CS or a related field. Some positions will be subject to a Government security background investigation and polygraph investigation, and must meet eligibility requirements for access to classified information.

We offer a demanding work environment, which affords a technical challenge, diversity and exceptional career growth opportunities, combined with competitive compensation and benefits. EOE. We value diversity in the workplace.

SAIC®

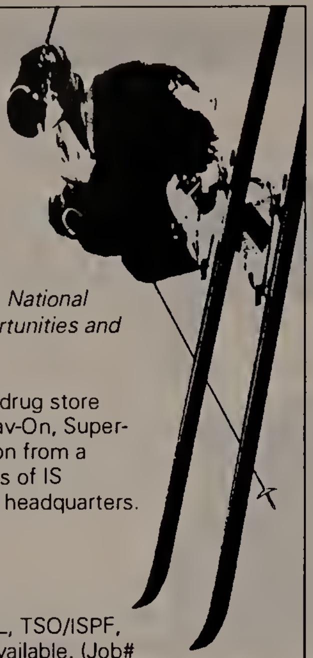
An Employee-Owned Company

Science Applications International Corporation

11251 Roger Bacon Drive, Reston, Virginia 22090

WISH YOU WERE HERE? WE DO!

Salt Lake City, Utah



Utah offers great skiing, backpacking, water sports, National Parks, an excellent family environment, social opportunities and affordable living.

AMERICAN STORES is a Fortune 50 retail grocery/drug store company, operating stores in 27 states as Lucky, Sav-On, Super-Saver, Jewel, and Osco Drug. Our recent conversion from a holding to an operating company has created dozens of IS openings in our new Salt Lake City based corporate headquarters. A sample of available opportunities follows:

Programmer Analysts

COBOL, DB2 & CICS required. SQL, MVS, IMS, JCL, TSO/ISPF, SDLC methodology desired. Senior positions also available. (Job# CW0226-PA)

Systems Analysts

COBOL, DB2 & SQL required. Delphi or C/S development, SDLC methodology, Endeavor preferred. Sr. positions also available. (Job# CW0226-SA)

Informix DBAs

3+ years' experience as an Informix Database Administrator required. DB2, Sybase, or Ingress RDBMS experience a plus. (Job# CW0226-DBA)

EPS Group Lead

COBOL, CICS, SAS, & DB2. Extensive project management experience, SDLC methodology, business anlaysis, and testing preferred. Knowledge of retail electronic payments industry highly desirable. (Job# CW0226-EPS)

In addition to an attractive compensation & benefits package, we offer a rare ground floor opportunity to join an established, growing company. To apply, please send/fax resume & salary requirements with a cover letter detailing your knowledge and experience to:

American Stores Company
IT Recruiter, Attn: Job#
PO Box 27447
Salt Lake City, UT 84127-0447
Fax: 801-320-4761

AMERICAN STORES COMPANY

Equal Opportunity Employer

Lucky • Acme • Jewel • Sav-On • Osco • Super Saver

PROGRAMMER ANALYST (Ref: 12096) - plan, develop, test & document comp. programs, applying knowledge of programming techniques & comp. systems; evaluate user request for new or modified programs; determine feasibility, cost & time req'd compatibility with current sys. & comp. capabilities; consult with user to identify current operating procedures & clarify program objectives; formulate plan outlining steps required to develop program using structured analysis & design; convert project specifications, using flowcharts & diagrams into sequence of detailed instructions & logical steps for coding into language processable by comp. Perform analysis, design & implementation of a project using Visual Smalltalk Enterprise (Smalltalk V, Team V) & Tensegrity on MS-Windows operating sys. running on IBM PC-586 (Pentium) machine. Reqs. Bach. in Comp. Sci., Systems Analysis, Computer Information Systems, Computer Engineering, Electrical Engineering, Electronic Engineering, Mathematics or its equiv. in ed & exp. & 2 yrs. exp. in job offered or 2 yrs. related exp. as a Programmer, Programmer Analyst, System Analyst, Software Engineer, Consultant, Systems Analyst/Programmer or Software Consultant. Will accept 3 yrs. of college ed. plus 3 yrs. exp. in the job offered or in a related occup. in lieu of the req'd ed. & exp. Must have some related exp. which included using each of the following: Smalltalk, Visual Works, Envy, Oracle, UNIX/AIX & INFORMIX. $57,000/yr. 40 hrs/wk., 8:30a-5p. Send resume to 7310 Woodward Ave, Rm 415, Detroit, MI 48202 & include Ref #. Employer Paid Ad.

Programmer/Analyst - Analyze business needs; design, develop & implement client server applications w/M.S. Windows 3.1 workstations & OS/2 server using C++, Visual Basic 3.0; perform data modeling using ERWINSOL case tools. Bachelors/Comp. Sci, Engg or Math. 2yrs/exp. in job offered or 2yrs as Systems Anal. &/or Cons. &/or Grad. Ass't. Related occ must incl. 1yr/exp. using OS/2 & M.S. Windows 3.1, C++, Visual Basic & ERWINSQL case tools. Will acc. deg. from foreign Universities if equiv. to U.S. deg. 40hrs/wk; (8-5). $46,000/yr. Will work at client sites in Raleigh, NC; & Co. loc in Durham, NC. Apply to the nearest Job Service office or submit a resume to: Job Service, 1105 Briggs Ave., Durham, NC 27703. All resumes must incl. applicant's Social Security #; & Job Order #NC3052383 & DOT code 030.162-014.

SAP

WORLDWIDE IMPLEMENTATIONS

ALL MODULES
Functional • Technical
ABAP • BASIS
Positions throughout the U.S.

Structured Logic Company, Inc.
5500 Interstate N. Pkwy. #450
Atlanta, GA 30328
800/599-9550
FAX: 770/937-0423
e-mail: slc11@aol.com
EOE MEMBER NACCB

---

http://careers.computerworld.com

Reserve your place in Computerworld's Best Places to Work Magazine!

Issue Date: June, 1996
Close : April 17, 1996

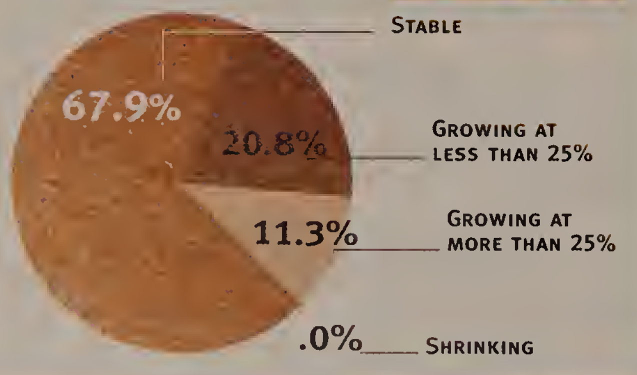
COMPUTERWORLD
The 100 Best Places to Work
Ranking the Best in the Business:
• IS Growth • Benefits
• Training • Diversity

1-800-343-6474 x8201

CAREER SURVEY: Banking Software

INDUSTRY HIRING TRENDS

OVERALL GROWTH RATE **9.1%**

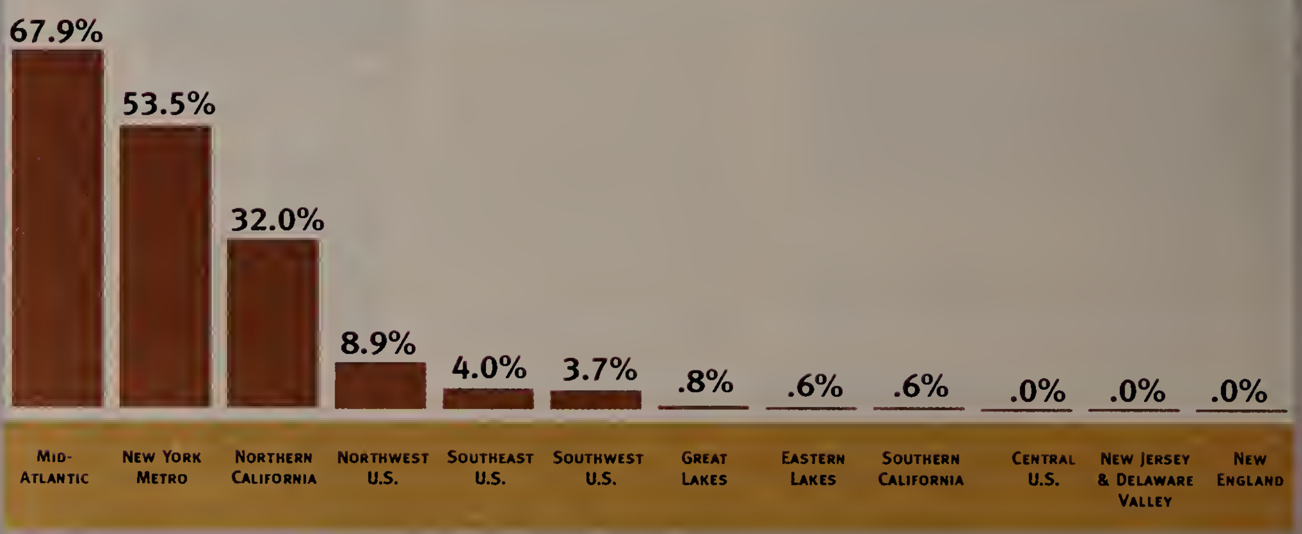


SURVEY BASE: 53 TECHNOLOGY FIRMS INVOLVED IN BANKING SOFTWARE

SURVEY CONDUCTED BETWEEN NOVEMBER '95 AND JANUARY '96;

© Copyright 1996, Corporate Technology Information Services, Inc., Woburn, Mass

REGIONAL GROWTH ANALYSIS



CORPTECH, A DIRECTORY PUBLISHER IN WOBURN, MASS., TRACKS THE U.S. 35,000 TECHNOLOGY MANUFACTURERS. THIS SURVEY RELATES TO THE 29,383 TRACKED FIRMS WITH FEWER THAN 1,000 EMPLOYEES.

SEE *COMPUTERWORLD*'S EXCLUSIVE
SURVEY REPORT ON 25 OF THE LARGEST
SYSTEMS INTEGRATORS,
FOLLOWING PAGE 64.

Marketplace

▶ What's giving you a headache today? If you have questions about your challenges -- managing vendors, choosing products, getting the best deals — industry experts can address them in a future Marketplace article. Forward questions to Amy Malloy (amy_malloy@cw.com) at Computerworld, 500 Old Connecticut Path, Framingham, Mass. 01701.

Shopping for a systems integrator

Peers can point buyers in the right direction. Then it's time to talk money.

BY ALAN RADDING

Finding the right systems integrator — a one-person shop, specialized boutique or giant, international firm — is a mix of art and process.

Computerworld spoke with two experts who offer advice about how to select a systems integrator: Gene Bledsoe, managing partner at Casal Group in Dallas, and Jeffrey Geibel, managing partner at Geibel Marketing Consulting in Belmont, Mass.

CW: Where do you start looking for the best systems integration deal?

Bledsoe: Systems integrators segment themselves by market, technology, product or skill set. Your best bet is to find one by word-of-mouth — someone who has done similar work successfully for someone else. You can spend a lot of time interviewing different systems integrators, but that involves a lot of wasted effort. Try to find referrals.

Geibel: Start by defining your specific area of need such as manufacturing systems or workflow or whatever. Identify the leading software brands in that area, and have a sense of the size and scope of your project such as the number of seats or servers. Call the software vendors for a list of integrators who are qualified in their technology. Just because they are on the vendor's list, however, is no assurance of [the integrators'] competency. You'll have to investigate them.

Preparation checklist

- ✓ Focus on the business problem, scope and scale
- ✓ Interview references extensively
- ✓ Develop detailed partnership specifications with the integrator at the outset
- ✓ Review bids for missing elements or padding
- ✓ Evaluate bids relative to the business value of the project
- ✓ Insist on experienced project management to control budget overruns
- ✓ Establish a procedure for early problem identification and resolution

CW: How do you choose among several systems integrators?

Geibel: Start by contacting likely candidates from the lists provided by the software vendors. Give some specifics about your project, such as size and scope, but not about your budget. Request a letter of interest that should include [the candidates'] capabilities and experience and three reference accounts. Listen to see if they are simply order-takers or if they bring greater value based on their experience. Do they help you anticipate issues?

CW: What can you expect from references?

Bledsoe: For projects that involve a major amount of money, consider visiting the reference site. In a site visit, you spend more time with the reference than you do over the phone so you can get beyond the initial vendor line. You meet more people who are involved with different aspects of the project, people who may have different feelings about the integrator.

Geibel: Find out from the reference what work was done by the company and what work was done by the integrator. Because these are references provided by the integrator, you won't hear about problems directly. You'll have to ask questions about every aspect of the project and read between the lines as you probe to see where problems arose or where things should have been done differently.

CW: How do you evaluate the price?

Bledsoe: Price is extraordinarily relative. Remember, you are trying to solve a business problem — buying something that will make you more efficient and productive. The price can be evaluated only in terms of your overall business return on investment. An $85-per-hour [deal] that provides you with a better system sooner may be a better deal in the long run than a $65-per-hour [deal]. It is unlikely you will get fixed-price bids, and no one will guarantee that there won't be cost overruns.

Geibel: You want to end up with three quotes that are itemized for hardware, software, consulting, project management, training and maintenance. If the gap between the highest and lowest is 15% to 20%, that's normal. If there is a wider gap, the low bidder probably is leaving something out or the high bidder is padding the job. Training should be an optional cost. Maintenance usually runs about 15% of the cost of the job, but that will vary depending on the level of support you need.

CW: How can you control cost overruns?

Bledsoe: You can minimize the chance of cost overruns by working with the integrator to develop comprehensive project specifications from the start. Everybody knows what steps are involved, what the deliverables will be and when they are expected. This is such a critical step that it is often worthwhile to pay the prospective integrator to develop such a specification at the outset. If you are uneasy about what the integrator is suggesting or you aren't getting the right answers at that point, say good-bye. ■

Radding is a freelance writer in Newton, Mass.

TRON

ADVERTISERS LISTINGS

MARKETPLACE
Where IS Buyers Find Solutions

INDEX

Computer Presentation
Boxlight (800) 762-5757 pg 116
Panelight (800) 726-3599 pg 117

Large Systems Computers & Peripherals
Spectra Equipment (800) 745-1233 pg 117

Outsourcing/Remote Computing
Alicomp (800) 274-5556 pg 117
AM Quest, Inc. (404) 264-5770 pg 117
Faneuil Systems (708) 574-3636 pg 117

Network Management
Wright•Line (800) 225-7348 pg 116

Security
Secure-It (800) 451-7592 pg 116

Systems & Services
Dempsey (800) 888-2000 pg 117

CLASSIFIED SOLUTIONS DIRECTORY

Bids/Proposals
Kiosks
Software

TRADESHOWS & EXHIBITIONS

Share Technical Conference
Anaheim
March 3 - 8

Application Dev. Conf. & Expo
New York
March 6 - 8

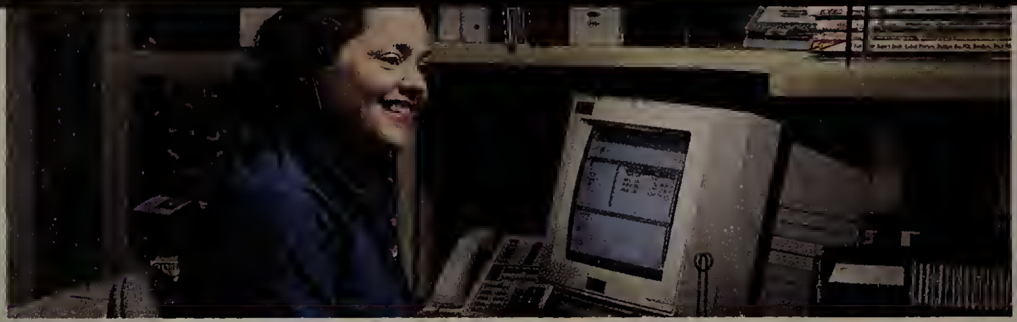
Software Developer's Conf.
Washington
March 25 - 29

Beacon™ 2500

$6,499

500 Lumens!

The new standard for brightness and value in conference room LCD projectors!
- True 500 ANSI Lumens!
- Auditorium or full room light use!
- Remote power Zoom & Focus
- 2 PC inputs, 2 video, 4 audio

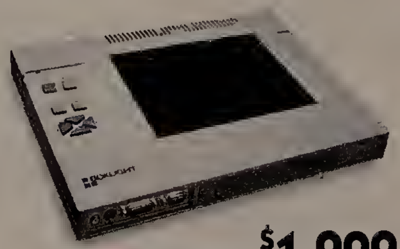


"Boxlight sells more electronic projection systems, to more people than anyone. Call to find out why."

ColorShow™ 2000+

ONLY $3,999

The first, and still the only TFT active-matrix projector you can buy for under $4,000!
- Sleek, compact & stylish design
- Less than 20 lbs. travel weight
- Includes free remote control



Limited Time! $1,999

ProColor™ 1301

TFT Active Matrix Color for under $2,000
- Save $1,000 on our Best Seller!
- Lightweight, reliable, rugged design
- Mac or PC, optional video & audio
- Easy-menu, zoom, freeze, pointer

As the most trusted name in Presentation Electronics™, we offer:
- Dialog with knowledgeable people who really help
- More than 50 models to choose from, available now
- Overnight shipping to multiple world-wide locations
- Money-back 30-day guarantee
- Free lifetime tech support

Monday through Friday, 6am — 5pm, Pacific Time. Purchase orders accepted (some restrictions). Prices subject to change. Quantities may be limited to stock on hand.

#1 For Rentals

Call BOXLIGHT today 1-800-762-5757

BOXLIGHT™ DIRECT

Government: (800) 497-4009
Resellers: (800) 736-6956
International: (360) 779-7901

Rental: (800) 736-6954
Fax: (360) 779-3299
Education: (800) 689-6676

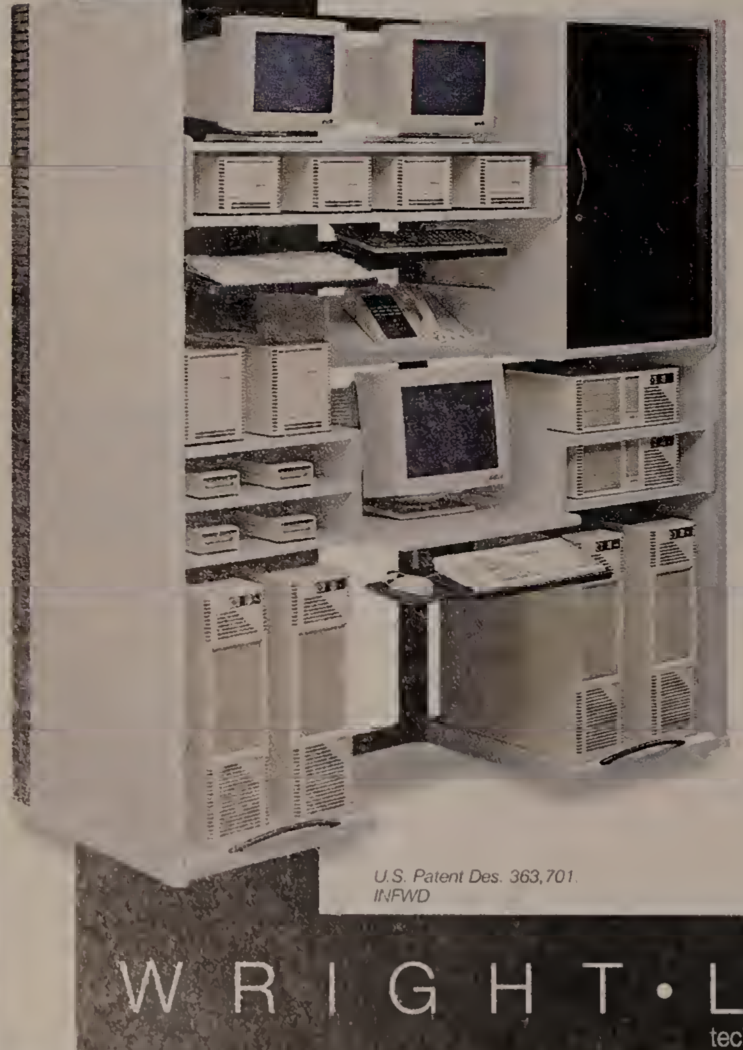
CW2

An Inc. 500 Company

The Inc. 500 logo is a registered trademark of Goldhirsh Group, Inc.

http://www.boxlight.com

Giant Leap for LANkind



U.S. Patent Des. 363,701
INFWD

LAN Management System II™

The complete network furniture system.
- Unmatched strength and stability
- Countless configuration choices
- Totally flexible and easily reconfigurable
- Superior cable management
- Lifetime Warranty
- QuickShip Program

For NEW 20-pg. Color Brochure:

CALL
800-225-7348
508-852-4300

FAX
508-853-8904

WRIGHT·LINE
technical furniture solutions

Kāblit™ Security

NOW!

STOP COMPUTER THEFT

IN THE OFFICE — ON THE ROAD
- Secure computer or notebook to desk, table, etc.
- Protect data
- Lifetime warranty

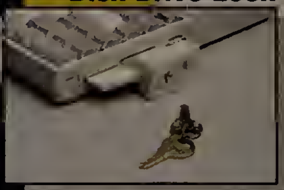
Kāblit™ II

Fixed Location List $34.95

Kāblit™ T-Lock

Any Location List $39.95

Disk Drive Lock



Data Security List $24.95

Padlock Security Provided by Master® Lock

Quick And Easy To Install!
Compact — Lightweight!
Available For Macintosh Computers Too!

TOUGH UNDER FIRE

Order Now — Call 800-451-7592

Secure-It

18 Maple Court, East Longmeadow, MA 01028, USA 413-525-7039

The particular Master® Lock Trademarks used are trademarks of the Master® Lock Company and are used by Secure-It, Inc. under license.

ALICOMP/CBS

Has a **SMALL BUSINESS DIVISION** *which has serviced over 165 diverse clients.*
It specializes in providing VM, MVS, VSE service to clients who need:

- **OUTSOURCING (Up to 10 MIPS)**
- **REMOTE COMPUTING**
- **TAPE CONVERSIONS**
- **SYSTEMS INTEGRATION CONSULTING**

Industry experience includes: •Financial Services •Non Profit •Software Developers •Healthcare •Manufacturing/Distributing •Publishing

We are the"Boutique" of the Computer Services World

Serving Clients since 1980

(201) 319-8787 • (800) 274-5556

IBM
- ES/9000
- SERIES/1
- AS/400
- RS/6000
- SYSTEM/88
- ...and more!

New & Used
- ***Computers***
- ***Peripherals***
- ***Upgrades***

Buy · Sell · Rent · Lease

SPECTRA
(800) 745-1233
(714) 970-7000 (714) 970-7095 Fax

Anaheim Corporate Center
5101 E. La Palma Ave., Second Floor
Anaheim, CA 92807

amdahl
Cisco
Concurrent
Data General
digital
HDS Hitachi Data Systems
HEWLETT PACKARD
Stratus
Sun
TANDEM
UNISYS
XEROX

Buy Sell Lease Rent

Dempsey: Your Source For IBM® Equipment

- ES/9000
- RS/6000
- Industrial PC
- Data Collection
- Series/1
- 9370
- AS/400
- All IBM PC's

- Processor
- Peripherals
- Upgrades

Pretested equipment, flexible financing, configuration planning, technical support and overnight shipping.

New & Reconditioned

Offices Nationwide...

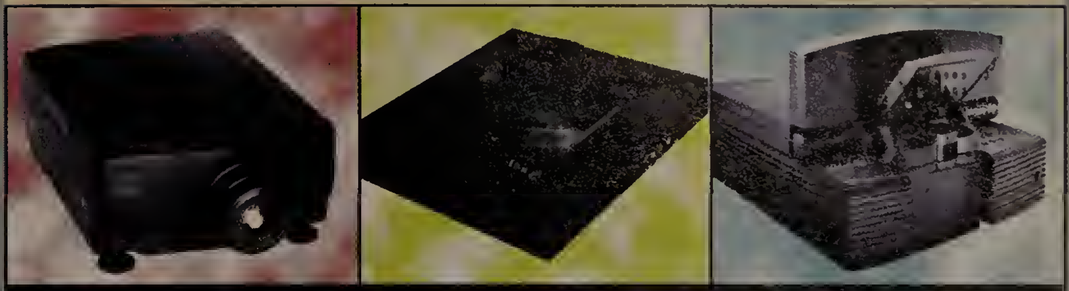
Call for ThinkPad memory:
1-800-888-2000

IBM® Business Partner
Authorized
Distributor Products
Integrator
IBM is a registered trademark of International Business Machine Corporation

Dempsey BUSINESS SYSTEMS
18377 Beach Blvd. • Huntington Beach, CA 92648
(714) 847-8486 • FAX (714) 847-3149

(800) 888-2000

IF WE DON'T SELL IT, IT'S NOT WORTH LOOKING AT.



PANELIGHT IS YOUR ONE STOP SHOP FOR ALL LEADING BRANDS
• SALES, RENTALS, & LEASES
• MONEY-BACK GUARANTEE • OVERNIGHT SHIPPING.

PANELIGHT OFFERS THE BEST IN SELF-CONTAINED LCD PROJECTORS, LCD PROJECTION PANELS, SUPER-BRIGHT OVERHEADS, MULTIMEDIA MONITORS, PC-TO-TV SCAN CONVERTERS AND ACCESSORIES FROM THE WORLD'S LEADING MANUFACTURERS SUCH AS HITACHI, IN FOCUS, PROXIMA, NEC, NVIEW, POLAROID AND OTHERS.

Panelight DISPLAY SYSTEMS, INC.

CALL THE EXPERTS AT PANELIGHT DISPLAY SYSTEMS, INC.

CALL PANELIGHT FOR OUR FREE CATALOG:
1-800-726-3599.
MON.-FRI., 6:30AM-5:30PM P.S.T.
24-HR. FAX: 415-986-3817

PANELIGHT DISPLAY SYSTEMS, INC.,
P.O. BOX 190940, SAN FRANCISCO, CA 94119.
OR CALL 415-772-5800.

Your best choice for mainframe computing services.

OUTSOURCING
REMOTE COMPUTING

Extensive Software Library

Telenet	Tymnet
Advantis	Compuserve

MVS/ESA	IMS/DBDC	
VM/ESA	CICS	SAS
VSE/ESA	TSO	DB2

Extraordinary Customer Service
Migration Management

708-574-3636
815 Commerce Drive, Oak Brook, IL 60521

FANEUIL SYSTEMS

AS/400 LinkServ

Centralized AS/400 Management from our Network Command Center

Console Monitoring
Monitor console and respond to alerts.
$125 to $225/mo. per AS/400

Operations Support
Problem analysis/resolution.
$95 to $295/mo. per AS/400

Call today
404-264-5770

AMQUEST
Amquest, Inc.
470 East Paces Ferry Road
Atlanta, GA (404) 264-5770

◆ KIOSKS

KIOSKS

End Users & Dealers Welcome!

Affordable
Starting under $500
UPS Shippable
Ready to Assemble
Design & Finish Options
Grey Speckle - White Trim
Cherry Speckle - Cherry Trim
Oak - Oak Trim

HSI Computer Systems 800-600-0067

◆ SOFTWARE

PC DIAGNOSTICS

OmniPost Analyzer
The only 3 in 1 tool:

1. IRQ and DMA conflict detection
2. Self-booting Diagnostics
3. Enhanced Power-On-Self-Test

- ◆ Works on Win95, Novell, DOS, Unix, OS/2
- ◆ Test XT, AT, ISA, EISA, VESA, PCI, PS/2 25 and 30
- ◆ 8- and 16-bit Hardware analyzer.

Call for FREE Diagnostic Software.

TriniTech, Inc.
1-800-909-3424

◆ BIDS & PROPOSALS

CITY OF NEW YORK
Request for Information
Technology Buying Service for Computers & Related Commodities

The City of New York would like to investigate the feasibility and benefits of contracting for a technology buying service for its computer hardware and related commodities.

Currently, the City enters into requirement contracts for information technology commodities with an estimated term usage of between $30 and $43 million. While keeping within applicable statutory and regulatory parameters, the City would like to investigate the potential flexibility gained from this type of outsourcing. Therefore, the City is soliciting comment from the private and public sectors for any information on this topic. Please respond if your company has been or is currently involved as a purchasing service or if you are a business entity or government agency which is currently outsourcing this technology procurement function.

If you are interested in responding to the Request For Information (RFI), please contact Helene Heller of the Mayor's Office of Operations at (212) 788-1412 with your FAX number, mailing address and/or Internet e:mail address, for a copy of the RFI questions and further information.

The City will be accepting information on the above until March 15, 1996, close of business.

◆ BIDS & PROPOSALS

Public Notice

Southwestern Bell has filed an application with the Public Utility Commission of Texas (PUC) to offer a new service called Positive ID. Positive ID enables customers to specify the incoming calls that can access their computer telephone numbers. Calls from telephone numbers that have been authorized for acceptance and/or from callers who have been given an access code will be accepted.

This application is proposed to become effective on April 1, 1996. The service will be offered state-wide on a staggered basis, through 1997, where facilities permit. The service is scheduled to be first available in the Austin metropolitan exchange with availability in Dallas/Fort Worth, Houston, and San Antonio to follow within six months.

Specific questions regarding the service, and its availability, should be directed to the Southwestern Bell Business Office.

Persons who wish to comment on this application should notify the Commission as soon as possible. Requests for further information should be mailed to the Public Utility Commission of Texas, 7800 Shoal Creek Blvd., Austin, Texas 78757, or you may call the Public Utility Commission Public Information Office at 512-458-0256, or 512-458-0221, teletypewriter for the deaf.

Southwestern Bell Telephone

SALES UP!
RESPONSE UP!

SEE WHAT THE CLASSIFIED SOLUTIONS SECTION CAN DO FOR YOU!

COMPUTERWORLD
MARKETPLACE
Classified Solutions

Call today to place your ad!
Ann Meleney 800-343-6474 ext. 7744

EXPENSES
DOWN!

Surfing for buyers of Internet Products?

Computerworld can help! Announcing . . .

The Computerworld Internet Resource Directory

- A unique pullout handbook style booklet
- Bound into Computerworld and distributed to over 143,000 IS professionals
- A convenient desktop reference for Internet needs

Issue Date: April 29, 1996 • Advertising Deadline: March 14, 1996

Call your Computerworld Marketplace sales representative today for details.
800-343-6474, ext. 7744

COMPUTERWORLD
Everything you need to know.

The Fastest Way To Bring Windows To Every Desktop Is A Tale Of NTrigue.

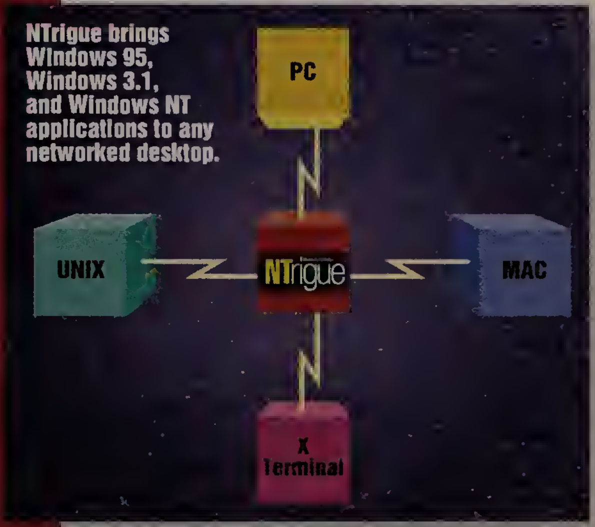
Metropolitan Tribune
Serving The Metropolitan Area Since 1800
WEDNESDAY NOVEMBER 15, 1995
Insignia Rocks The NT World
Brings high speed Windows to the enterprise

Introducing NTrigue™. Software That Delivers Windows Applications To UNIX Workstations, X-Terminals, PCs and Macs.

Finally, getting Windows® applications to every desktop at high-performance is no longer a mystery. It's NTrigue.

NTrigue includes Microsoft® Windows NT,™ bringing thousands of Windows 95, Windows 3.1 and Windows NT applications to all your desktops at blazing speeds. That's big news, because NTrigue is faster than any other solution.

But that's just half the story. NTrigue is the only Windows NT-based solution that fully supports the X Window System, an industry standard. Which means it's the only product that works on all enterprise desktops. Everything from Macs, Power Macs and PCs, to UNIX® workstations and X-terminals. You can even deliver Windows applications over dial-up, ISDN, WANs and the Internet.


NTrigue brings Windows 95, Windows 3.1, and Windows NT applications to any networked desktop.
PC
UNIX
NTrigue
MAC
X Terminal

MICROSOFT® WINDOWS NT™ COMPATIBLE

With NTrigue, you can renew all of your older PCs. Now these classics can run Windows 95 applications without expensive hardware upgrades.

So for the fastest way to bring Windows to every desktop, get new NTrigue. And make headlines all across your enterprise.

Call 508/682-7600

NTrigue Windows On All Desktops

Windows On All Desktops

INSIGNIA SOLUTIONS

Insignia Solutions, River Bend Business Park, 6 Campanelli Drive, Andover, MA [illegible] • [illegible] 682-7600 • Fax (508) 688-8294.
In Europe, contact Insignia Solutions, Phone +44 131 458 6849 • Fax +44 131 451 698[illegible] NTrigue is a trademark, and Insignia and Insignia Solutions are registered trademarks of Insignia Solutions Inc. Windows NT is a trademark, and Microsoft and Windows are registered trademarks of Microsoft Corporation. UNIX is a registered trademark licensed exclusively through X/Open Company, Ltd. All other trademarks are the property of their respective holders. © 1995 Insignia Solutions Inc. All rights reserved.

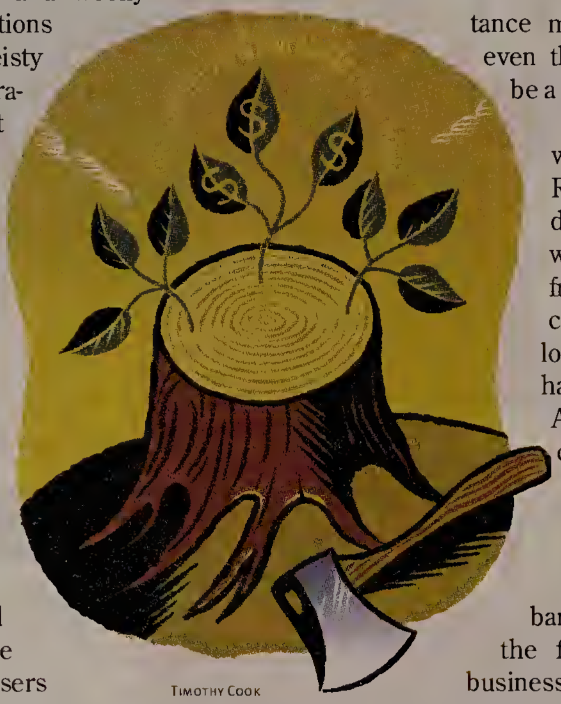
Chip stocks: Finding solid investments in a down market, 122

Ready to RBOC and roll?

Investing in the telephone company is no longer for your grandmother

By Neal Weinberg

Those wonderful days of yesteryear, when holding stock in the regional Bell operating companies (RBOC) meant a guaranteed rate of return and steady dividend checks, are over.



Timothy Cook

Welcome to the wild and woolly world of telecommunications deregulation, in which feisty RBOCs attack the lucrative long-distance market while opening their local fiefdoms to invading interexchange carriers and cable operators.

RBOC stocks had a sterling year, as Wall Street bid them up in anticipation of deregulation, according to Connie Luecke, an analyst at Duff & Phelps, Inc. in Chicago. But RBOC stocks will be a mixed bag this year, and it will be a good two years before clear winners and losers emerge from the fray, she adds.

To pick likely winners, investors should watch for companies that demonstrate marketing acumen, are able to generate name recognition and can deliver innovative new services to market, Luecke says. She recommends Ameritech Corp., BellSouth Corp. and Nynex Corp.

While Luecke predicts mixed results, other analysts are bullish on all seven Baby Bells.

"RBOCs — with a large part of a long-distance network already built, with a customer base and franchise already established, and with four long-distance networks to buy from — are sitting pretty," says Daniel Reingold, first vice president at Merrill Lynch & Co. in New York.

In fact, Reingold puts Ameritech at the top of his long-term buy list, predicting earnings per share of $3.75 in 1996, compared with $3.40 in 1995. The company, which recently raised its quarterly dividend by 6%, has top-notch management, has successfully cut its costs and is well positioned to enter the long-distance market, he says.

But Jack B. Grubman, group leader for the Salomon Brothers, Inc. Global Telecom Team, takes a bearish view.

"We continue to believe that the net impact of long-distance entry and competition in the local arena will be a slight negative for the RBOCs," Grubman writes in his latest research report.

Grubman puts a "hold" rating on all seven RBOCs, based on a number of factors. First, the RBOCs can't enter the long-distance market until they first demonstrate that they have opened their local loop to competition. He predicts that the RBOCs won't enter the long-distance market until 1998, and even then, long distance will be a low-margin business.

Reingold argues that it will be easy for the RBOCs to jump into long distance because they will simply buy capacity from whichever interexchange carrier offers the lowest price. And they have four players — AT&T, MCI Communications Corp., Sprint Corp. and LDDS WorldCom — to pit against one another.

Grubman says another barrier for the RBOCs is the fact that Fortune 500 business customers are looking for global one-stop shopping and advanced features such as consolidated billing, nationwide customer service and the creation of international virtual private networks. The Baby Bells face a steep learning curve in those areas and in basic marketing, he adds.

But Reingold points out that deregulation gives the RBOCs the incentive to slash costs and to ratchet up high-margin services such as voice mail, caller identification, second lines and Integrated Services Digital Network.

Mergers also are likely to play a role in the future of the RBOCs. The industry has been rife with talk of a Nynex/Bell Atlantic Corp. deal. And Reingold suggests that Pacific Bell could ultimately join the deal, creating an East Coast-West Coast RBOC triumvirate.

1995 RBOC revenues

BellSouth	$14.5B
Ameritech	$13.4B
Bell Atlantic	$13.4B
Nynex	$13.4B
SBC Communications (Southwestern Bell)	$12.7B
US West Communications	$11.7B
Pacific Telesis Group	$9B

Streetware

Chuck Phillips

CA: Quietly becoming a giant

When I started following Computer Associates International, Inc. (NYSE:CA) as a budding analyst 10 years ago, few of us thought it would ever report $1 billion in sales in a single quarter. And yet that's just what it did in its most recent quarter.

Clearly, the company has created stockholder wealth. CA's stock was at $7.58 10 years ago. Today, it's about $70, and revenue is headed for $3.5 billion. Moreover, CA has managed to keep 39 cents — after expenses but before taxes — of every dollar of revenue. Most software companies keep only 17 cents.

Still, the Street has doubts. The price-to-earnings ratio of comparable companies, such as Oracle Corp. (NASDAQ:ORCL) and Informix Corp. (NASDAQ:IFMX), is 35-to-1 or 40-to-1 compared with about 20-to-1 for CA. Why? Investors like companies with visible, easy-to-understand products. Few investors understand what goes on in computer boiler rooms. And 70% of CA's revenue is derived from mainframe-related products.

But CA's products manage a valuable asset: the enterprise computing infrastructure of the last two decades. During that period, the company either beat or bought its competition and now dominates its market.

However, like every company with a good growth story, CA faces a few risks. First, how will the company's business model change as customers migrate to distributed computing? Its success with CA-Unicenter may determine the answer to that question.

Secondly, will CA's strategy of financing customer purchases turn the company into a bank with bum loans? Although the strategy has helped it to gain market share, CA has about $2.7 billion of receivables — money owed by customers — on its balance sheet. While the numbers are nerve-racking, cash flow suggests that the receivables are fine.

Thirdly, the pending IBM (NYSE:IBM)/Tivoli Systems, Inc. (NASDAQ:TIVS) combination poses a challenge. The pairing will offer the market a solid architecture for systems management. However, it also will encourage IBM competitors Hewlett-Packard Co. (NYSE:HWP) and Sun Microsystems, Inc. (NASDAQ:SUNW) to partner more closely with CA.

CA's huge installed base, tight cost controls and strong sales force will likely translate into continued growth. Despite spotty customer support in the early 1990s, the company has significantly improved customer relationships over the past three years. And CA's flexible licensing plans have been a hit with customers.

CA has proved the skeptics wrong for many quarters, and we expect its success to continue.

Phillips is the enterprise software industry analyst at Morgan Stanley & Co., a global investment banking firm in New York. He welcomes comments at chasp@ms.com or (212) 761-4450.

Stock Ticker February 23, 1996

Gainers		Losers	
PERCENT			
Intelligent Info. Systems	23.1	Pinnacle Micro Inc.	-35.6
State of the Art	21.6	Merisel (L)	-35.6
4th Dimension	20.5	Radius Inc. (L)	-19.2
TriCord Systems	20.0	VLSI Technology	-16.7
LSI Logic Corp.	17.3	DSC Communications	-12.5
US Robotics (H)	17.3	Intersolv Inc.	-8.0
Advanced Logic Research	17.0	Cognitronics Corp.	-7.5
Telebit Corp.	15.7	UUNET Tech.	-7.5
DOLLAR			
US Robotics (H)	17.25	Pinnacle Micro Inc.	-4.50
Shiva Corp.	9.75	DSC Communications	-4.44
Intuit Inc.	8.00	UUNET Tech.	-3.00
Cascade Communications (H)	7.00	VLSI Technology	-2.38
IBM (H)	6.88	Netscape Comm. Corp.	-2.00
FORE Systems Inc.	6.75	Netcom On-Line	-1.63
McAfee Associates (H)	6.38	GTE Corp.	-1.50
Security Dynamics Tech.	6.25	Network Equipment Tech.	-1.50

Industry Almanac

Cashing in on chips

Despite bad news from the integrated circuit industry, investors may still be able to cash in on chips. Analysts point out that there are still good investment opportunities here. The key is to avoid companies that make memory chips and those that ship most of their chips to the PC industry.

Those two categories make up 60% of the industry, with the other 40% consisting of firms that make other types of chips, such as microcontrollers and programmable logic devices, said Drew Peck, an analyst at Cowen & Co. in Boston. The best investments today are in that "other" category, he says.

One company in this category is **LSI Logic Corp. (LSI)**. Although it has made chips for the PC industry, "right now, their exposure to PCs is probably in the single digits," Peck notes.

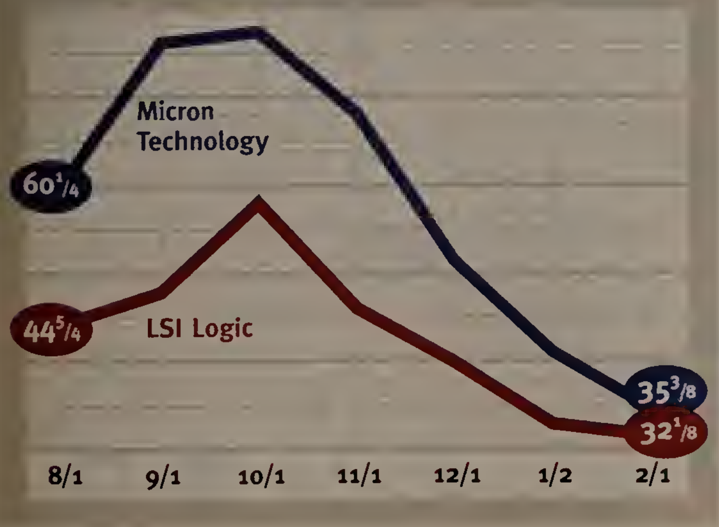
Dan Niles, an analyst at Robertson Stephens & Co. in San Francisco, agrees that LSI Logic is a good play. Although the firm may have a rough upcoming quarter, it is "well positioned in the communications sector, with essential parts in [Asynchronous Transfer Mode] and digital video disc," he says.

By all means, though, stay away from memory chip stocks, such as **Micron Technology, Inc. (MU)**. Niles points out that memory prices, already plunging, are likely to take another hit in late March as the Japanese end their fiscal year and flush out excess inventory.

"I wouldn't touch memory companies with a 10-foot pole right now," Peck says. —*Tam Harbert and Stewart Deck*

Falling where they may

Despite a rough six months, chip companies with limited exposure to the PC industry, such as LSI Logic, are good prospects, analysts say



Communications and Network Services — UP 1.84%

Exch	52-Week Range			Feb. 23 3 PM	Wk Net Change	Wk Pct Change
COMS	53.63	23.88	3Com Corp.	49.25	1.00	2.1
AIT	66.88	40.75	Ameritech Corp.	60.00	0.38	0.6
AXE	22.13	16.63	Anixter Intl.	18.88	0.00	0.0
APTS	15.00	2.75	Apertus Tech.	4.00	0.25	6.7
T	68.88	47.88	ATT	66.00	-0.13	-0.2
ASND	47.25	6.63	Ascend Communications	45.88	3.75	8.9
BNYN	18.63	6.00	Banyan Systems Inc.	8.44	-0.56	-6.3
BNET	50.00	20.38	Bay Networks Inc.	47.50	2.50	5.6
BEL	80.38	50.75	Bell Atlantic Corp. (H)	67.38	-1.13	-1.6
BLS	45.88	28.25	BellSouth Corp.	40.38	0.25	0.6
BBN	48.75	15.63	Bolt, Beranek and Newman	33.00	1.00	3.1
BRKT	35.50	12.75	Brooktrout Technology	33.75	0.31	0.9
CS	87.75	38.13	Cabletron Systems	75.75	0.13	0.2
CSCC	108.50	30.38	Cascade Communications (H)	108.50	7.00	6.9
CGRM	25.13	12.75	Centigram Communications	18.13	1.38	8.2
CSCO	48.81	16.38	Cisco Systems Inc. (H)	48.81	4.19	9.4
CLIX	11.38	6.00	Compression Labs Inc.	7.19	-0.44	-5.7
CMNT	12.75	4.00	Computer Network Tech.	4.75	0.13	2.7
XCOM	14.50	8.75	CrossComm	10.50	-0.19	-1.8
DIGI	64.00	21.88	DSC Communications	31.19	-4.44	-12.5
FORE	67.75	25.50	FORE Systems Inc.	67.25	6.75	11.2
GDC	24.38	9.25	General Datacomm Inds.	11.88	0.00	0.0
GSX	42.50	28.00	General Signal Networks	37.25	2.13	6.0
GTE	49.25	31.88	GTE Corp.	43.63	-1.50	-3.3
MCIC	31.00	19.09	MCI Commmunications Corp.	29.38	-0.63	-2.1
MICM	12.50	5.50	MICOM Communications Corp.	8.00	-0.13	-1.5
MNPI	29.88	9.13	Microcom Inc. (H)	29.00	0.63	2.2
NETM	34.00	10.00	NetManage Inc.	11.75	0.13	1.1
NTRX	8.88	3.63	Netrix Corp.	4.38	0.13	2.9
NCDI	12.00	4.38	Network Computing Devices	6.00	0.13	2.1
NWK	42.00	19.75	Network Equipment Tech.	30.50	-1.50	-4.7
NETG	46.50	22.75	Network General	39.75	1.63	4.3
NN	53.25	25.00	Newbridge Networks Corp.	48.13	-1.38	-2.8
NT	50.88	31.50	Northern Telecom Ltd.	48.50	-0.50	-1.0
NOVL	23.25	12.00	Novell Inc.	12.63	-0.25	-1.9
NYN	59.25	38.00	Nynex Corp.	52.25	0.63	1.2
OCTL	42.63	18.00	Octel Communications Corp.	38.13	0.13	0.3
ODSI	43.25	12.75	Optical Data Systems Inc.	28.00	0.50	1.8
PCTL	43.88	13.25	Picturetel Corp.	41.75	2.25	5.7
PTON	10.75	5.50	Proteon Inc.	6.13	-0.38	-5.8
RACO	7.88	4.25	Racotek Inc.	4.75	-0.25	-5.0
RETX	5.50	1.81	Retix	4.25	-0.13	-2.9
SFA	24.88	11.38	Scientific Atlanta Inc.	17.00	0.25	1.5
SHVA	82.75	27.00	Shiva Corp.	82.75	9.75	13.4
SBC	60.25	39.63	Southwestern Bell Corp.	56.38	0.75	1.3
FON	45.50	27.75	Sprint Corp.	44.13	0.13	0.3
SMSC	29.50	12.50	Standard Microsystems Corp.	16.50	1.00	6.5
STRM	41.75	16.00	Stratacom Inc.	41.75	1.00	2.5
TBIT	8.63	2.38	Telebit Corp.	5.06	0.69	15.7
USRX	117.25	26.00	US Robotics (H)	117.25	17.25	17.3
USW	48.38	28.38	U S West Inc.	34.00	0.00	0.0
XIRC	18.00	8.88	Xircom	10.50	0.19	1.8

PCs and Workstations — UP 0.00%

Exch	52-Week Range			Feb. 23 3 PM	Wk Net Change	Wk Pct Change
AALR	9.63	4.13	Advanced Logic Research	7.75	1.13	17.0
AAPL	50.13	26.84	Apple Computer Inc.	29.81	1.94	7.0
ASTA	19.13	6.63	AST Research Inc. (L)	7.00	-0.38	-5.1
CPQ	56.75	31.13	Compaq Computer Corp.	51.75	2.13	4.3
DELL	49.38	19.88	Dell Computer Corp.	34.75	4.38	14.4
GATE	37.50	16.00	Gateway 2000 Inc.	30.25	1.88	6.6
HWP	100.88	56.75	Hewlett Packard Co. (H)	100.88	5.75	6.0
MUEI	29.88	9.25	Micron International Inc.	12.50	0.25	2.0
NIPNY	75.13	46.63	NEC America	59.50	-0.63	-1.0
SGI	45.63	21.13	Silicon Graphics	26.75	0.00	0.0
SUNW	53.50	15.00	Sun Microsystems Inc.	53.50	5.75	12.0

Large Systems — UP 2.91%

Exch	52-Week Range			Feb. 23 3 PM	Wk Net Change	Wk Pct Change
AMH	13.63	6.75	Amdahl Corp.	8.56	-0.06	-0.7
CYR	29.25	16.00	Cray Research Inc.	25.50	0.75	3.0
DGN	19.13	6.75	Data General Corp.	16.88	-0.50	-2.9
DEC	76.50	31.50	Digital Equipment Corp.	73.38	3.75	5.4
IBM	125.00	73.75	IBM (H)	125.00	6.88	5.8
MDCD	13.00	3.00	Meridian Data Inc.	12.25	0.38	3.2
NETF	7.75	4.25	NetFrame	5.31	0.19	3.7
SQNT	25.38	11.25	Sequent Computer Sys.	12.00	0.50	4.3
SEQS	10.00	3.63	Sequoia Systems Inc.	4.38	0.00	0.0
SRA	36.13	23.00	Stratus Computer Inc.	28.88	-0.25	-0.9
TDM	18.00	9.25	Tandem Computers Inc.	10.00	-0.13	-1.2
TRCD	5.88	2.00	TriCord Systems	3.75	0.63	20.0
UIS	13.63	5.50	Unisys Corp.	6.63	-0.13	-1.9

Software — UP 3.22%

Exch	52-Week Range			Feb. 23 3 PM	Wk Net Change	Wk Pct Change
ADBE	74.25	30.00	Adobe Systems Inc.	37.00	1.75	5.0
AMSWA	8.75	2.88	American Software Inc.	4.31	0.06	1.5
APLX	40.75	7.75	Applix Inc.	36.50	0.00	0.0
ARSW	48.50	28.75	Arbor Software	44.25	1.25	2.9
ACAD	53.00	27.75	Autodesk Inc.	36.88	1.25	3.5
BACH	11.88	3.75	Bachman Info. Systems	10.88	0.38	3.6
BGSS	42.00	26.00	BGS Systems Inc.	35.25	-0.75	-2.1
BMCS	58.00	27.63	BMC Software Inc.	53.75	0.63	1.2
BOOL	26.38	18.25	Boole and Babbage	23.75	0.50	2.2
BORL	20.88	7.13	Borland Int'l Inc. (H)	20.38	0.56	2.8
CESH	3.94	1.38	CE Software	3.25	0.38	13.0
CYE	27.88	12.38	Cheyenne Software Inc.	23.75	2.50	11.8
COGNF	49.75	18.75	Cognos Inc. (H)	49.75	1.69	3.5
CA	74.50	36.75	Computer Associates (H)	72.88	2.13	3.0
CVN	15.50	4.63	Computervision Corp.	11.13	-0.38	-3.3
CPWR	39.00	15.50	Compuware Corp.	22.81	0.81	3.7
CSRE	27.25	9.88	Comshare Inc.	21.75	-1.50	-6.5
COSFF	19.50	8.38	Corel Corp.	11.00	-0.25	-2.2
DWTI	16.25	6.25	Dataware Technologies Inc.	7.75	0.50	6.9
DSLGF	32.25	9.75	Discreet Logic Inc.	14.00	0.88	6.7
FILE	65.75	30.00	Filenet Corp. (H)	63.50	-0.38	-0.6
DDDDF	8.25	3.38	4th Dimension	5.88	1.00	20.5
FTPS	40.63	10.38	FTP Software Inc.	13.25	0.75	6.0
GSOF	26.00	7.50	Group I Software	7.50	0.00	0.0
GPTA	12.25	4.88	Gupta	5.50	0.13	2.3
HOGN	13.88	4.63	Hogan Systems Inc.	11.88	-0.13	-1.0
HYSW	28.38	14.00	Hyperion Software Corp.	19.13	0.50	2.7
IRIC	18.63	10.00	Information Resources	15.13	-0.63	-4.0
IFMX	34.38	16.63	Informix Corp.	32.44	1.00	3.2
INGR	20.13	10.00	Intergraph Corp.	18.50	-0.63	-3.3
LEAF	12.63	4.25	Interleaf Inc.	9.63	0.63	6.9
ISLI	26.25	8.75	Intersolv Inc.	12.88	-1.13	-8.0
INTU	89.25	29.63	Intuit Inc.	64.25	8.00	14.2
LGWX	19.50	10.88	Logic Works	16.50	0.00	0.0
MGICF	12.88	3.63	Magic Software Enterprises (H)	11.50	0.81	7.6
MANU	20.50	9.50	Manugistics Group Inc.	15.00	1.75	13.2
MAPS	40.00	10.00	MapInfo Corp.	12.25	-0.25	-2.0
MATH	7.38	2.75	MathSoft	6.25	-0.38	-5.7
MCAF	56.25	13.13	McAfee Associates (H)	56.25	6.38	12.8
MENT	22.88	10.88	Mentor Graphics	13.88	-0.25	-1.8
MIFGY	12.88	8.25	Micro Focus	9.38	0.00	0.0
MGXI	15.13	5.75	Micrografx Inc.	13.13	0.25	1.9
MSFT	109.25	59.50	Microsoft Corp.	102.50	3.88	3.9
ORCL	53.25	28.00	Oracle Corp. (H)	52.75	0.00	0.0
PMTC	75.25	35.75	Parametric Technology (H)	75.25	4.25	6.0
PARQ	18.75	6.63	ParcPlace Systems Inc.	9.50	0.13	1.3
PSFT	55.25	16.63	Peoplesoft	55.25	3.25	6.3
PTEC	16.13	6.13	Phoenix Technologies	13.63	0.00	0.0
PSQL	16.88	3.13	Platinum Software	6.13	0.63	11.4
PLAT	26.00	11.25	Platinum Technology	13.63	0.75	5.8
PRGS	38.00	19.50	Progress Software Corp.	21.81	1.44	7.1
RNBO	26.75	15.13	Rainbow Technologies Inc.	23.00	-0.75	-3.2
ROSS	7.75	2.19	Ross Systems	2.56	-0.06	-2.4
SDTI	65.75	11.88	Security Dynamics Tech.	65.75	6.25	10.5
SKEY	51.75	13.38	Softkey International Inc.	25.63	2.13	9.0
SPCO	5.13	2.19	Software Publishing Corp.	3.00	0.13	4.3
SQAX	24.00	16.00	SQA Inc.	22.25	0.00	0.0
SOTA	13.38	6.63	State of the Art	13.38	2.38	21.6
SSW	65.50	32.88	Sterling Software Inc. (H)	64.88	1.88	3.0
SDRC	31.13	6.25	Struct. Dynamics Research	30.75	0.75	2.5
SYBS	45.75	19.88	Sybase Inc.	34.69	2.06	6.3
SYMC	33.25	9.88	Symantec Corp.	13.38	0.63	4.9
SNPS	38.50	22.63	SynOpsys	34.00	0.00	0.0
SSAX	30.63	12.63	System Software Assoc.	23.38	-0.88	-3.6
SYSF	18.13	7.75	Systemsoft Corp.	11.31	-0.69	-5.7
TRUV	10.13	3.88	Truevision Corp.	5.50	0.25	4.8
VIEW	15.13	8.38	ViewLogic Systems	10.38	0.00	0.0
VMRK	21.50	5.75	VMark Software Inc.	8.00	0.13	1.6
WALK	11.13	4.63	Walker Interactive Systems	10.25	0.13	1.2
WALL	55.50	13.00	Wall Data Inc.	15.25	1.25	8.9
WANG	21.88	11.13	Wang Laboratories Inc.	21.88	0.13	0.6

Internet — OFF 1.57%

Exch	52-Week Range			Feb. 23 3 PM	Wk Net Change	Wk Pct Change
AMER	56.50	16.25	America On-Line (H)	56.50	4.63	8.9
NETC	91.50	19.00	Netcom On-Line	28.63	-1.63	-5.4
NSCP	87.00	22.88	Netscape Comm. Corp.	61.00	-2.00	-3.2
QDEK	39.50	3.38	Quarterdeck Corp.	18.75	0.00	0.0
SPYG	61.00	13.25	Spyglass Inc.	31.13	-0.75	-2.4
UUNT	98.75	21.75	UUNET Tech.	37.25	-3.00	-7.5

Semiconductors — UP 2.51%

Exch	52-Week Range			Feb. 23 3 PM	Wk Net Change	Wk Pct Change
AMD	39.25	16.13	Advanced Micro Devices	20.38	0.38	1.9
ADI	28.88	15.50	Analog Devices Inc. (H)	28.88	1.38	5.0
CHPS	15.88	6.25	Chips and Technologies	8.81	-0.19	-2.1
CRUS	61.13	16.00	Cirrus Logic	19.75	0.88	4.6
CY	27.75	10.00	Cypress Semiconductor Corp.	13.50	0.00	0.0
INTC	78.38	38.63	Intel Corp.	60.50	2.38	4.1
LSI	62.50	22.50	LSI Logic Corp.	37.38	5.50	17.3
LSCC	43.00	22.75	Lattice Semiconductor	35.25	2.00	6.0
MCRL	32.50	12.50	Micrel Semiconductor Inc.	15.50	-0.50	-3.1
MU	94.75	27.75	Micron Technology	38.13	2.25	6.3
MOT	82.50	44.75	Motorola Inc.	58.13	2.88	5.2
NSM	33.63	14.88	National Semiconductor	17.38	1.25	7.8
SERA	28.75	9.75	Sierra Semiconductor	20.00	1.00	5.3
TXN	83.75	38.25	Texas Instruments	53.38	3.13	6.2
VLSI	39.13	11.88	VLSI Technology	11.88	-2.38	-16.7
WWTK	6.88	1.88	Weitek	2.38	-0.13	-5.0
WDC	22.13	13.13	Western Digital Corp.	19.38	-0.63	-3.1
XLNX	55.50	20.38	Xilinx	44.63	2.88	6.9
ZLG	54.13	28.50	Zilog Inc.	38.38	0.50	1.3

Peripherals and Subsystems — UP 1.92%

Exch	52-Week Range			Feb. 23 3 PM	Wk Net Change	Wk Pct Change
APCC	25.88	7.88	American Power Conversion	10.63	0.94	9.7
ADPT	50.75	29.25	Adaptec Inc. (H)	50.38	2.56	5.4
CBEX	13.13	3.50	Cambex Corp.	6.25	0.75	13.6
CGN	7.25	2.25	Cognitronics Corp.	4.63	-0.38	-7.5
CREAF	14.13	5.88	Creative Technologies Inc.	7.94	0.19	2.4
RACE	13.13	3.63	Data Race Inc.	4.38	0.38	9.4
DTM	9.38	4.19	Dataram Corp. (L)	4.44	-0.13	-2.7
EMC	27.38	13.00	EMC Corp.	19.00	1.25	7.0
EMLX	28.50	6.38	Emulex Corp.	10.88	0.13	1.2
ESCC	25.25	12.25	Evans and Sutherland	21.25	-0.50	-2.3
EXBT	19.13	10.00	Exabyte	13.75	0.25	1.9
IISLF	4.25	1.50	Intelligent Info. Systems	2.00	0.38	23.1
IOMG	18.00	1.88	Iomega Corp.	15.38	1.06	7.4
IPLSA	7.88	2.50	IPL Systems Inc.	4.38	0.25	6.1
KMAG	37.50	11.50	Komag Inc.	31.13	1.00	3.3
MLIS	7.50	2.44	Micropolis Corp.	2.88	-0.13	-4.2
MTSI	37.75	11.25	Micro Touch Systems Inc.	16.00	0.75	4.9
PEAK	34.75	16.75	Peak Technology Group	22.25	2.25	11.3
PNCL	19.75	5.88	Pinnacle Micro Inc.	8.13	-4.50	-35.6
PTNX	38.75	13.50	Printronix Inc.	18.25	0.88	5.0
AQM	7.75	3.25	QMS Inc.	4.75	-0.38	-7.3
QNTM	28.50	13.75	Quantum Corp.	16.94	-0.19	-1.1
RDUS	14.38	1.31	Radius Inc. (L)	1.31	-0.31	-19.2
SEG	66.50	23.63	Seagate Technology (H)	66.50	5.25	8.6
STK	30.13	17.88	Storage Technology	28.88	1.63	6.0
TEK	61.88	31.38	Tektronix Inc.	46.88	1.88	4.2
XRX	144.63	107.25	Xerox Corp.	130.38	1.88	1.5

Services — UP 0.48%

Exch	52-Week Range			Feb. 23 3 PM	Wk Net Change	Wk Pct Change
AMSY	24.63	11.38	American Mgmt. Systems (H)	24.00	0.25	1.1
ANLY	33.00	20.00	Analysts Int'l	31.63	-0.38	-1.2
AUD	43.38	30.25	Auto Data Processing	40.25	-0.25	-0.6
CATP	61.00	26.00	Cambridge Tech. Partners	51.25	4.75	10.2
CEN	47.50	30.13	Ceridian Corp.	45.88	1.00	2.2
CDO	23.75	16.38	Comdisco Inc.	21.38	-0.50	-2.3
CHRZ	33.50	6.38	Computer Horizons	30.75	-1.25	-3.9
CSC	80.75	46.50	Computer Sciences (H)	77.50	-0.25	-0.3
TSK	22.00	9.50	Computer Task Group	18.00	0.00	0.0
CPU	44.38	17.50	CompUSA Inc.	39.00	4.63	13.5
CDAT	21.38	6.50	Control Data Systems Inc.	19.88	1.00	5.3
EGGS	14.25	5.00	Egghead Discount Software	5.63	-0.25	-4.3
GME	57.38	37.50	General Motors E (EDS)	56.75	1.50	2.7
INAC	16.75	7.88	Inacom Corp.	16.75	1.50	9.8
INEL	14.63	3.50	Intelligent Electronics	6.25	0.25	4.2
KEA	30.88	18.25	Keane Inc.	26.38	2.25	9.3
MSEL	8.38	2.38	Merisel (L)	2.38	-1.31	-35.6
MICA	15.00	7.25	Microage Inc.	9.63	-0.31	-3.1
PAYX	58.50	25.88	Paychex	57.25	0.63	1.1
PMS	54.25	41.63	Policy Management Sys.	52.13	0.13	0.2
REY	39.63	25.88	Reynolds and Reynolds	38.75	0.63	1.6
SEIC	24.50	17.25	SEI Corp.	23.00	-0.25	-1.1
SMED	58.00	32.00	Shared Medical Systems	54.19	-0.69	-1.3
SSPE	26.50	14.88	Software Spectrum Inc.	18.75	-0.25	-1.3
SNDT	35.75	20.13	Sungard Data Systems	35.00	1.88	5.7

KEY: (H) = New annual high reached in period (L) = New annual low reached in period

Copyright Nordby International Inc., Boulder, Colorado

This information is based on sources believed to be reliable, and while extensive efforts are made to assure its accuracy, no guarantees can be made. Nordby International and Computerworld assume no liability for any inaccuracies. For information on Nordby's customized financial research services, call 1 (800) 926-7404.

Companies in this issue

Page number refers to page on which story begins. Company names can also be searched at http://www.computerworld.com.

3Com Corp. 1
Ace Industries, Inc. 49
Advanced Software
Products Group, Inc. 44
Agile Networks 60
Air Express International......... 76
Alco Corp.............................. 49
Alexander LAN, Inc.................. 60
AllPen Software, Inc................. 70
Amdahl Corp. 90
America Online 4
Ameritech............................. 121
AMP, Inc. 100
Andataco................................ 91
Apple Computer, Inc.. 8,32,65,70
Arbor Software, Inc. 20
ARDIS Co. 24
Association for
Computing Machinery 80
Association for Women
in Computing 80
AT&T Corp. 16,57,84,100,121
Baltimore Gas & Electric Co. 1
Banyan Systems, Inc. 66
Bay Networks, Inc. 14,60
BBN Corp. 6
Becton Dickinson & Co. 84
Bell Atlantic Corp. 121
Bell Communications
Research, Inc. 80
Bell Global Solutions
of Canada 57
Berger Advanced
Management Services 73
BindView Development Corp.. 60
Blue Cross/Blue Shield
of Minnesota 76
Blyth Software, Inc. 52
Boole & Babbage, Inc. 8
Braxton Associates 8
Brooks Internet Software........ 70
BT Networks 57
Cabletron Systems, Inc. 60
Cactus International, Inc. 1
Cambex Corp. 91
Candle Corp. 8
Capital Markets Technology...105
Caterpillar, Inc. 100
Center for Project
Management 84
Central & South West Corp. 1
Central House
Technologies, Inc. 66
Cheyenne Software, Inc. 14
Cigna Corp. 80
Cisco Systems, Inc. 1,14,60
Communications Network
Architects, Inc. 14
Compaq Computer Corp. 1,6,
....8,41
CompuServe, Inc. 8,57
Computer Associates
International, Inc. 52,76,121
Compuware Corp. 76
Connectware Corp. 100
CSC Consulting
and Systems Integration......... 80
Cyrix Corp. 4
D. H. Brown Associates 54
Data General Corp. 16,91
Datalogix International, Inc. ... 49
Dator.................................. 100
DayStar Digital, Inc. 32
Dell Computer Corp. 1,4
Design Group, Inc. 60
Digital Equipment Corp... 8,12,14,
.... 41,44,70,100
Digital India 100
Digital Equipment Computer
Users Society 12
Duff & Phelps, Inc. 121
Duke Power Co. 1
Dynasty Technologies, Inc. 52
Eicon Technology, Inc. 8
Electronic Book
Technologies, Inc. 79
EMC Corp. 90,91,96
Entergy Corp. 1
Exabyte Corp. 41
First Virtual Corp. 73
Flagstar Companies, Inc. 8
Forte Software, Inc. 52
Four11 Corp. 66
FTP Software, Inc. 65
Fujitsu Systems Business
of America, Inc. 55
Gateway 2000, Inc. 32
Geibel Marketing Consulting.. 117
General Electric Co. 100
General Electric Information
Services 76
Genesis Health Venture 80
German Dynamic Research Center
for Information Technology 65
Gil Gordon Associates 73
Gradient Technologies, Inc. 8
H&R Block, Inc. 8
Harmonic Systems, Inc. 73
Hewlett-Packard Co. 6,12,14,
................................44,60,100
Hitachi Data Systems Corp. 90
IBM PC Co. 8
IBM ... 1,4,6,8,29,32,41,44,52,54,
......57,65,70,73,76,80,90,96,100
Information Presentation
Technologies, Inc. 1
Infosys Technologies Ltd. 100
Ing. C. Olivetti & Co. 32
Insight Software
Solutions, Inc. 55
Institute of Electrical and
Electronics Engineers, Inc. 80
Insync Corp. 32
Integrated Business
Solutions Co. 76
Integrated Systems
Solutions Corp. 8,76
Intel Corp. 4,16,32,44,100
Isogon Corp. 76
Knozall Systems, Inc. 60
Kurzweil Applied
Intelligence, Inc. 6
Lawrence Livermore
National Laboratory 73
LDDS WorldCom 121
Loan Systems 60
Lockheed Martin Corp. 12,76
Lotus Development Corp. 29,
.... 49,52,57,66,80
LSI Logic Corp. 123
Madge Networks, Inc. 73
MapInfo Corp. 55
MCI Communications Corp..... 57,
.... 73,121
Melville Corp. 76
Micro Design
International, Inc. 44
Micron Technology, Inc. 123
Microsoft Corp. 1,8,12,14,
...................29,32,41,49,52,54,
...................55,57,60,65,78,100
Microstrategy, Inc. 65
Mindscape, Inc. 14
Motorola Computer Group 32
NAC Reinsurance 29
Nat Systems International, Inc. 52
National Semiconductor
Corp. 1,29
NCN, Inc. 60
NEC Corp. 4
NetFrame Systems, Inc. 41
Netquest 100
Netscape Communications
Corp. 1,12,29,65,66,70
Networth, Inc. 1
NII Testbed 57
Nortel Communications
Systems 14
Novell, Inc. 8,14,29,57,60,100
Object Technology International,
Inc. 8
Open Software Foundation 8
Open Systems International, Inc. 1
Open Text Corp. 65
Oracle Corp. 1,8,10,49,65
Owens Corning Corp. 8
Pacific Bell 121
Pacific Gas & Electric Co. 1
Packard Bell Electronics, Inc. .. 32
Panda Electronics Group 32
ParaTechnology, Inc. 29
ParcPlace-Digitalk Inc. 8
Pencom Systems, Inc. 105
PeopleSoft, Inc. 49
Perfect Solutions, Inc. 100
Performance Technology, Inc...14
Pier 1 Imports, Inc. 73
PKWare, Inc. 55
Power Computing Corp. 32
PowerCerv Corp. 60
Pratt & Whitney Canada, Inc. .. 44
Precept Software, Inc. 60
Preferred Systems, Inc. 14
Prodigy Services Co. 8
Quad Tech International 65
Quantum Corp. 41
R. R. Donnelley & Sons Co. 1
Radius, Inc. 32
RAM Mobile Data 24
Rhode Island Soft
Systems, Inc. 55
Riosoft Corp. 100
Rogue Wave Software, Inc. ... 1,52
Rubin Systems, Inc. 100
Sabre Computer Service 24
Salomon Brothers, Inc. 1,121
Sandoz Pharmaceutical Corp.. 29
SAS Institute, Inc. 76
Satyam Computer
Services Ltd. 100
Schlumberger/Geco-Prakla 16
SCO, Inc. 41
SeaLand Services, Inc. 100
Sears, Roebuck & Co. 8
SecureWare, Inc. 12
Security First Network Bank 12
Security Forces, Inc. 16
Security Systems Integration and
Consulting, Inc. 14
Shared Medical Systems 80
SHL Systemhouse, Inc. 76
Sigma Dataserv Informatica...100
Silicon Graphics, Inc. 41,65
Society for Information
Management 57
Softex 2000 100
Software Publishing Corp. 55
Softwright 1
Sony, Inc. 44
Sourcecom Corp. 14
Sprint Corp. 121
Spyglass, Inc. 65
Storage Computer Corp. 91,94
Storage Concepts, Inc. 91
Storage Dimensions, Inc. 41,91
Storage Technology
Corp. 90,91,96
Summit Strategies, Inc. 12
Sun Microsystems, Inc. 1,14,
.......................41,44,54,60,65,66
SunSoft, Inc. 100
Sybase, Inc. 52
Synon, Inc. 12
System Software
Associates, Inc. 1,76
SystemSoft Corp. 44
TakeFive Software 66
Tandem Computers, Inc. 100
Tata Consultancy Services 76
Tata Information
Systems Ltd. 100
Tata Unisys Ltd. 100
TEAC America, Inc. 44
Technology Business
Research 32
TeleChoice, Inc. 1
Texas Instruments 4
TGV Software, Inc. 14
Thomas-Conrad Corp. 1
TitleLink 57
Toner Corp. 105
Toshiba America Information
Systems, Inc. 8
Toyota Motor Corp. 84
Transarc, Inc. 6,8
U.S. Healthcare 80
UB Networks, Inc. 14,100
Umax Computer Corp. 32
Unisys Corp. 41
US West Communications, Inc. 57
USAnimation, Inc. 44
Verifone, Inc. 66,80
VeriSign, Inc. 66
Visible Decisions, Inc. 65
Visual Components, Inc. 70
Wal-Mart Stores, Inc. 73
Western Surety Co. 6
Whitetree, Inc. 73
Windows Support Group 8
Wipro Infotech Group 100
Workgroup Strategic
Services, Inc. 32,41
WorldCom 57
Xcellenet, Inc. 73
Xylan Corp. 60
Zona Research, Inc. 44,65

Contacting CW Editors

CONTACTING US BY PHONE

All editors can be contacted at our main phone number, (508) 879-0700, unless otherwise noted below. Our **24-hour news tip line** is (508) 820-8555. For **subscriptions,** call (800) 669-1002, **back issues**, call (508) 820-8129, **reprints,** call (508) 820-8125.
Our **main fax number** is (508) 875-8931.

CONTACTING US BY E-MAIL

Our Web address is www.computerworld.com. All of our staff members can be reached via E-mail on the **Internet** using the form firstname_lastname@cw.com. IDG News Service correspondents can be reached using the form firstname_lastname@idg.com. **Subscription** inquiries go to circulation@cw.com.

Letters to the editor are welcome and should be sent to letters@cw.com. Please include your address and telephone number.

Our **CompuServe** address is 76537,2413 for editorial correspondence only. Direct **subscription** inquiries to CompuServe: 73373,1230.

Respond to our **Talkback** inquiries at talkback@cw.com.

CONTACTING CW EDITORS

We invite our readers to call or write with comments and ideas. It is best to submit ideas to one of the department editors as well as to the appropriate beat reporter.

Editor	Paul Gillin (508) 620-7724
Executive Editor	Maryfran Johnson (508) 820-8179

DEPARTMENT EDITORS/NEWS

News Editor	Patricia Keefe (508) 820-8183
Sections Editor	Johanna Ambrosio (508) 820-8553
Assistant Sections Editor	Michael Fitzgerald (508) 820-8206
Associate News Editor	Mitch Betts (202) 347-6718

SENIOR EDITORS/NEWS

Government and security news	Gary H. Anthes (202) 347-0134
Local-area networks	Laura DiDio (508) 820-8182
Network management	Patrick Dryden (817) 924-5485
Systems management, storage	Bob Francis (214) 387-1188
Application development	Frank Hayes (503) 252-0100
IS management	Thomas Hoffman (201) 587-0090
Microsoft systems software	Stuart J. Johnston (206) 641-7770
Client/server applications software	Julia King (610) 532-7599
Internet	Kim S. Nash (214) 716 9822
Apple and OS/2	Lisa Picarille (415) 548-5571
Databases	Dan Richman (360) 579-2065
IBM large systems and software	Craig Stedman (508) 820-8120
Internet	Mitch Wagner (415) 548-5513
Internetworking	Bob Wallace (508) 820-8214
Telecommunications, Unisys	Neal Weinberg (508) 820-8177

SENIOR WRITERS/NEWS

Mobile computing	Mindy Blodgett (508) 820-8168
DEC, most midrange hardware	Michael Goldberg (508) 620-7789
Imaging, multimedia	Suruchi Mohan (415) 548-5515
Groupware, E-mail	Tim Ouellette (508) 820-8215
PC hardware	Jaikumar Vijayan (508) 820-8220

STAFF WRITERS/NEWS

New Products Writer	Stewart Deck (508) 820-8155

OPINIONS/VIEWPOINT

Technical Editor	Charles Babcock (415) 548-5512
Viewpoint Editor	Mitch Betts (202) 347-6718

DEPARTMENT EDITORS/FEATURES

Technology Evaluations/CW Guide	James Connolly (508) 820-8144

SENIOR EDITORS/FEATURES

Managing	Allan E. Alter (508) 620-7714
In Depth	Lory Zottola Dix (508) 820-8236
In Depth	Kathleen Gow (508) 820-8236
Finance & Investing	Tam Harbert (508) 620-8147
Re-engineering/ corporate strategies	Joseph Maglitta (508) 820-8192
Management	Robert L. Scheier (508) 628-4931
Careers	David B. Weldon (508) 820-8166

ASSOCIATE EDITORS/FEATURES

CW Guide	Cathleen Gagne (508) 620-7729
Managing	Steve Ulfelder (508) 620-7745

RESEARCH

Bob Fink, senior research manager (508) 820-8116; Kevin Burden, senior researcher; Laura Hunt, research analyst; Amy Malloy, assistant researcher; Stefanie McCann, senior graphics coordinator.

SPECIAL PROJECTS, SUPPLEMENTAL PUBLICATIONS

(Including Premier 100, Global 100, Best Places to Work, Campus edition, Leadership Series and Salary Survey)
Bruce Rayner, special projects editor (508) 820-8195; Joyce Chutchian-Ferranti, Pat Erickson, managing editors; Kay Carstens, copy editor.

COPY DESK

Anne McCrory, chief copy editor (508) 820-8205; Ellen Fanning, assistant chief copy editor; Christina Aicardi Maguire, senior copy editor; Kimberly Gilliard, Michelle Grabon, senior production copy editors; Jamie Eckle, Roberta A. Fusaro, Pat Hyde, David Ramel, copy editors.

GRAPHIC DESIGN

Tom Monahan, design director (508) 820-8218; Janell Genovese, Mitchell J. Hayes, Nancy Kowal, senior graphic designers; David Waugh, Mary Beth Welch, Stephanie Werskey, graphic designers; Rich Tennant, John Klossner, cartoonists.

ADMINISTRATIVE SUPPORT

Linda Gorgone, office manager (ext. 8176); Connie Brown (ext. 8178), Aleksandra Skulte (ext. 8172), Lorraine Witzell (ext. 8139), editorial assistants; Chris Flanagan, West Coast editorial assistant, (415) 548-5563.

COMPUTERWORLD CLIENT/SERVER JOURNAL

Alan Alper, editor (508) 820-8115; Mary Brandel, executive editor; Catherine McCrorey, managing editor; Stephanie Faucher, art director; Kimberlee A. Smith, assistant managing editor.

IDG NEWS SERVICE CORRESPONDENTS

Paris bureau chief	Marc Ferranti (33) 1-4904-8001
Paris correspondent	Cara Cunningham (33) 1-4904-7917
Munich correspondent	Torsten Busse (49) 89-811-6057
UK correspondent	Ron Condon (44) 181-460-0944
Tokyo correspondent	Rob Guth (81) 33-358-6122
Taipei correspondent	Terho Uimonen (88) 62-500-6523

Second class postage paid at Framingham, Mass., and additional mailing offices. Posted under Canadian International Publication agreement #0385697. Computerworld (ISSN 0010-4841) is published weekly: except a single combined issue for the last week in December and the first week in January by Computerworld, Inc., 500 Old Connecticut Path, Box 9171, Framingham, Mass. 01701-9171. Copyright 1996 by Computerworld, Inc. All rights reserved. Computerworld can be purchased on microfilm and microfiche through University Microfilms Inc., 300 N. Zeeb Road, Ann Arbor, Mich. 48106. Computerworld is indexed. Back issues, if available, may be purchased through the circulation department. Photocopy rights: permission to photocopy for internal or personal use is granted by Computerworld, Inc. for libraries and other users registered with the Copyright Clearance Center (CCC), provided that the base fee of $3.00 per copy of the article, plus $.50 per page is paid directly to Copyright Clearance Center, 27 Congress Street, Salem, MA 01970. Reprints (minimum 500 copies) and permission to reprint may be purchased from Sharon Bryant, Computerworld, Inc., 500 Old Connecticut Path, Box 9171, Framingham, Mass. 01701-9171. Requests for missing issues will be honored only if received within 60 days of issue date. Subscription rates: $6.00 a copy: U.S. — $48 a year; Canada — $110 a year; Central & So. America — $150 (surface) a year; Europe — $295 a year; all other countries — $295 a year. Subscriptions call toll free (800) 669-1002. POSTMASTER: Send Form 3579 (Change of Address) to Computerworld, P.O. Box 2044, Marion, OH 43305.

Support, NT server troubles plague Netscape

CONTINUED FROM PAGE 1

main names, such as www.uvsg.com, from one instance of Commerce Server on Windows NT, which isn't an unusual practice.

"Occasionally, one of the domains would just shut off," explained Brian Boyd, director of Internet services at the company.

After several calls to Netscape's technical support department, "neither of us ever identified the problems," he said. United Video has since switched to Microsoft Corp.'s Internet Information Server.

A similar glitch appeared at another Netscape user site in Kentucky that was running three domains from a single Netscape Commerce Server on NT. The server, which received roughly 10,000 hits per day, had to be rebooted every three hours, the webmaster there said.

Many users were desperate for acknowledgment from their vendor. "Why have they not responded to placate our fears?" asked Richard Ruda, a developer at Open Systems International, Inc., a San Diego applications maker.

Most irksome is that "Netscape is *very* poor about admitting bugs, suggesting work-arounds, creating updates and patches and giving any kind of reasonable support," said Tony Ray, a programmer at Cactus International, Inc., a desktop software firm in Mount Airy, Md.

Ray said he will ask Netscape to return the $995 he paid for a support contract after he got "nothing but silence these last six months."

Improving support "is a major, major issue" for Netscape, Pann said. He said the vendor hires additional support staff daily. One hundred of Netscape's 700 employees work in customer support. Further, any customers with unanswered questions can send mail to Pann, he said, at davidp@netscape.com.

"Whether it's two or 20 or 200, I will make sure we follow up with each and every one," he pledged.

Netscape also points to its own Web site, which runs on Unix-based Netscape servers, as proof that its products can handle heavy traffic. The site gets 45 million hits, or user requests, daily. That makes it one of the Top 3 most visited locales on the Internet.

Still, the support gripes are a rising tide in the Netscape-run user newsgroups on the Web. "You guys at Netscape better get your act together or you will see your market shrink dramatically," one recent missive warned.

Ted Julian, an analyst at International Data Corp. in Framingham, Mass., said he wasn't surprised by support complaints. Netscape's hypergrowth in the six months since its initial public offering makes the vendor a prime candidate for falling short of customer demands.

Microsoft, IBM and other more established vendors already have set up high-volume support centers, Julian noted. "That's going to be a differentiator for these Fortune 500 companies evaluating [Web] products."

Pretty but performance-killing 3-D Internet standard draws support. See page 65.

Products add BBS-style discussion groups to 'net

By Mitch Wagner

Last week, users were pitched a trio of products designed to add bulletin board-style discussion group capabilities to the Internet.

The packages will allow users to hold on-line discussions on an Internet site by posting short text messages to a bulletin board service (BBS)-style setup, organized by subject.

The announcements included the following:

- **O'Reilly & Associates** in Sebastopol, Calif., is shipping its $175 WebBoard, a no-frills BBS server for World Wide Web servers that supports BBS-style discussion. It runs on Windows 95 and Windows NT and currently requires O'Reilly's Website server or the Web Commander server from Luckman Interactive.
- For users with more complex needs, **Galacticomm, Inc.**'s BBS server software, WorldGroup 2.0, runs side-by-side with any standard Web server. The $476 product allows discussion groups through plug-ins to Netscape Communications Corp.'s Navigator client.

The discussion groups are just one of a set of multimedia plug-ins available from Galacticomm. The software is available immediately.

- Also on the fancy side is Version 5 of the Wildcat BBS from **Mustang Software, Inc.** The $699 server, which will ship in April, runs on Windows 95 or Windows NT. Operators of the BBS can hold discussion groups, post files for downloading and give users access to the Web, Usenet and other Internet offerings.

Users said the marriage of technologies means it is now possible to access discussion groups without dialing in to a BBS.

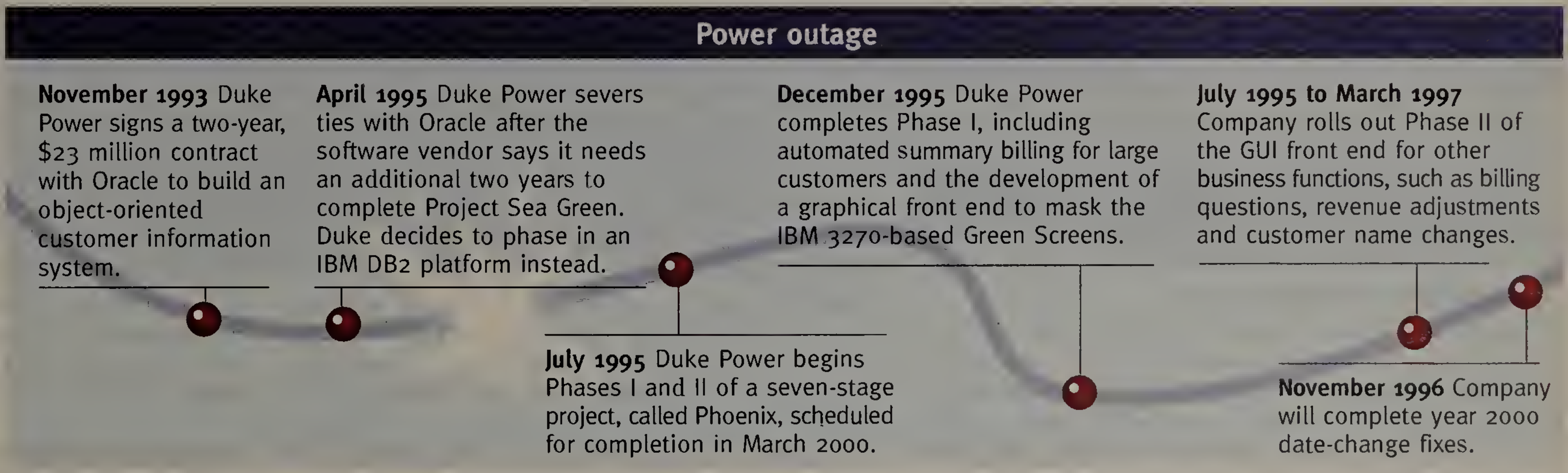
"Being able to zap over via the Internet means you don't have to dial in using a long-distance provider," said David Palmer, auditing supervisor at Monterey Peninsula TV Cable in Monterey, Calif., which uses the Mustang BBS.

Utility

CONTINUED FROM PAGE 1

Even the Oracle executive who led the Duke project acknowledged its shortcomings.

"The object-oriented methods and tools proved not to be scalable to a problem of this size and complexity," said Steve Perkins, a vice president at Oracle Consulting who oversaw the CIS project. The main difficulty, he said, was generating object computer-aided software engineering tools from the data models that Oracle consultants developed during their two years on the Duke job.



Power outage

November 1993 Duke Power signs a two-year, $23 million contract with Oracle to build an object-oriented customer information system.

April 1995 Duke Power severs ties with Oracle after the software vendor says it needs an additional two years to complete Project Sea Green. Duke decides to phase in an IBM DB2 platform instead.

July 1995 Duke Power begins Phases I and II of a seven-stage project, called Phoenix, scheduled for completion in March 2000.

December 1995 Duke Power completes Phase I, including automated summary billing for large customers and the development of a graphical front end to mask the IBM 3270-based Green Screens.

July 1995 to March 1997 Company rolls out Phase II of the GUI front end for other business functions, such as billing questions, revenue adjustments and customer name changes.

November 1996 Company will complete year 2000 date-change fixes.

Project rises again

But the CIS project isn't completely undone. Duke is applying the business rules and data models that Oracle created to replace a 22-year-old IBM VSAM-based CIS with a three-tiered IBM DB2 architecture. The resuscitated project is aptly named Phoenix "for the mythical bird that rises from the ashes," said Hugh McCutcheon, the new project manager.

Phoenix will be delivered in seven phases through March 2000, and user acceptance will be closely tracked during that time.

That tracking "gives the business [users] a chance to see the system as it's being rolled out and suggest changes where they're needed," McCutcheon explained. "Contrast that to having someone develop what is your company's most important system over a two-year period, cutting it over a weekend and not knowing what you're getting."

Even though Phoenix is a "less ambitious" effort than the object-based scheme, McCutcheon noted that it has many of the same goals. Those include electronic bill payments via electronic data interchange (EDI) and the Internet.

Clock is ticking

All utilities are under immense time pressure to create modernized CISs because deregulation will soon allow now captive customers to choose their energy supplier.

Yet several industry experts said they weren't surprised that Duke was forced to sink Project Sea Green.

"What often happens is people build a very elegant object model, then discover that the real world is very different," said Martin Anderson, former founder and chairman of Softwright, a U.K.-based object development firm that is now part of System Software Associates, Inc. in Chicago. One of the biggest problems is mapping software objects to relational database management systems such as Oracle's, which are optimized for transaction-oriented environments. Object-oriented systems, by contrast, are event-driven systems.

Transaction-oriented systems are used to track, for example, customer orders. Event-driven systems, by contrast, typically follow customized business rules, such as generating all customer orders greater than $100,000 on the same programming run.

Since July, Duke has been using Microsoft Corp.'s Visual Basic to develop a Windows-based graphical interface for 1,200 CIS users (see time line).

Game plan

Duke is also using Cobol-II programming tools to generate new code for the IBM DB2 database. Among other things, Duke's 600 call center agents will use Phoenix to handle more than 1 million residential service orders annually, McCutcheon said.

Call center agents and other back-office end users will use Windows-based workstations to access customer information via Windows NT servers.

Duke has been processing EDI-based billing with its large commercial customers since November 1995. Meanwhile, the utility already has written software for Internet-based bill payments and plans to test the software with one of its customers by midyear.

Other leading-edge utilities, such as Entergy Corp. in New Orleans, Central & South West Corp. in Dallas and Pacific Gas & Electric Co. in San Francisco, are also modernizing their CISs to reduce costs. They also want to "find out more about their customers," said Kathleen A. Lally, a utilities analyst at Salomon Brothers, Inc. in New York.

Object software influences IS buying. See page 49.

If NT wows 'em, do they need Windows 95?

Charles Babcock

The Meta View

The home and business markets are distinct, and Microsoft wants to dominate both.

Dennis Martin, president of the Rocky Mountain Windows NT User Group, recently stood outside the yawning, 800-seat meeting room at the Denver Tech Center Marriott and wondered if he'd miscalculated.

The group normally drew 70 to 80 people to its meetings, and Martin had been dubious about reserving such a large meeting site. But the first unveiling of Microsoft's Windows NT with the Windows 95 user interface — NT Version 4.0 beta code — was slated to be staged before his group, and he wanted to be prepared.

As he waited for the meeting to begin, long lines of people filed by the registration desk, and soon a crowd 900-strong filled the auditorium. Windows 95 may be taking hold slowly in corporations, but in the front range of the Rocky Mountains, the next wave was anticipated to be NT.

The crowd included information systems managers from small and medium-size companies and skilled technical people from HP, Digital, Big Six accounting firms and computer consulting companies from throughout the Denver region.

"We'll give our first class next week in Windows 95, which is shocking, because we've been ready to do it since September," said J. Michael Ray, manager at Colorado Computer Training Ltd. in Fort Collins, Colo. Corporate users have been slow to upgrade to Windows 95, he said, although a recent *Computerworld* poll found that 78% planned on doing so within the next 18 months.

At the Rocky Mountain NT User Group, assurance was in short supply that this migration would occur on schedule. With the Windows 95 interface in NT, "you'll see a lot more demand for NT Workstation," Ray predicted.

Martin has advocated skipping the move to Windows 95 and going straight to Workstation NT for its superior robustness and security features.

"NT is safer. If one program crashes, it's not going to crash another," said another attendee, Robert Mager, a PC installer and configuration consultant in Lafayette, Colo.

There still aren't enough management utilities for NT. It doesn't support enough 16-bit device drivers. And it doesn't support Plug and Play as Windows 95 does.

Nevertheless, after the meeting, I made a $10 bet with my favorite Windows 95 advocate that the number of IS shops that would upgrade from Windows 3.1x to NT would grow from 17% to more than 33% by the time of the 1997 *Computerworld* survey.

In response to a question, Microsoft's demonstrator of NT 4.0 at the Denver meeting, Frank Atale, made an unintentional argument for why this will be true. When asked if Windows and Windows NT will be just one operating system, he replied, "Probably not."

The features you put in a "consumer-oriented or home operating system are not really appropriate to the business user," he noted, concluding, "We will maintain two versions going forward."

This is the first time I've heard a Microsoft official admit what I've suspected all along. The home and business markets are distinct, and Microsoft wishes to dominate both — through two distinct operating systems.

And which one do you think is the consumer operating system? The one focused on robustness and security or the one named after the year in which it comes out?

* * *

Brion Peck, manager of support services at US Air in Pittsburgh, has found savings for the money-losing airline by using information technology to carefully analyze departmental data.

One example: He tracked the number of liquor servings going into aircraft vs. the revenue coming out. Because liquor is given away in first class, the accounting has always been loose. As he looked at the amount used vs. liquor revenue, however, he concluded that either US Air was disgorging some highly intoxicated first-class passengers or that there was some shift of stocks from first class into coach, where it could disappear in various ways. Peck implemented more precise accounting methods.

"Just being able to expose the tracking system to flight crews has increased liquor revenues dramatically," he noted.

Charles Babcock's column now appears in this space every other week, alternating with the CW Crossword Puzzle.

Babcock is *Computerworld*'s technical editor. His Internet address is charles_babcock@cw.com.

Inside Lines

Slipping into overdrive

Intel is gearing up to announce Pentium OverDrive upgrade processors the week of March 4. The chips are expected to provide an upgrade path to Pentium performance for those who use DX4 100-MHz-based systems, according to a source close to the company. Intel will also introduce upgrade chips for 60-MHz and 66-MHz Pentium-based systems, which will boost their performance to 100 MHz and 133 MHz, respectively. Intel will launch its 133-MHz mobile Pentium chips the same week.

Wireless link to free users

US Robotics Mobile Communications in Salt Lake City will launch a multifunction wireless link for portable systems in April at Networld/Interop '96. The Megahertz AllPoints Wireless PC Card will support electronic mail, faxing, paging and text-to-voice messaging. The card costs $499 and fits the slot of palmtop, Apple PowerBook and Windows-based laptop systems. Two battery options power the wireless connection up to 30 hours.

Just grab a megaphone

Notes 3.34 users who haven't gone to Notes 4.0 yet may have at least one reason to consider the move. We've heard about a case where a glitch in Notes 3.34's message Reply feature sent a confidential message meant for one person to everyone in the company. It seems a user received a Global Notes message and wanted to respond to the sender only, with a copy to one other user. After hitting the Reply button and entering the sender's E-mail address in the To: field, Notes decided to cc: the message to everyone else, too.

Call me, already!

Remember what it was like to be a lonely teen-ager, staring at the phone for hours and waiting for that special someone to call? Wouldn't it have been great to just press a "call me" button to *make* the other person pick up the phone? Well, that's what Edify Corp. in Santa Clara, Calif., plans to introduce March 4, with software that combines telephony and the World Wide Web. A visitor to a Web site clicks on a "call me" button onscreen, and a background application automatically dials the visitor's phone number and connects the call to a salesperson or customer service representative when the visitor to the Web site picks up the phone. Edify hopes to sell its product to companies that conduct sales or customer service on the Internet.

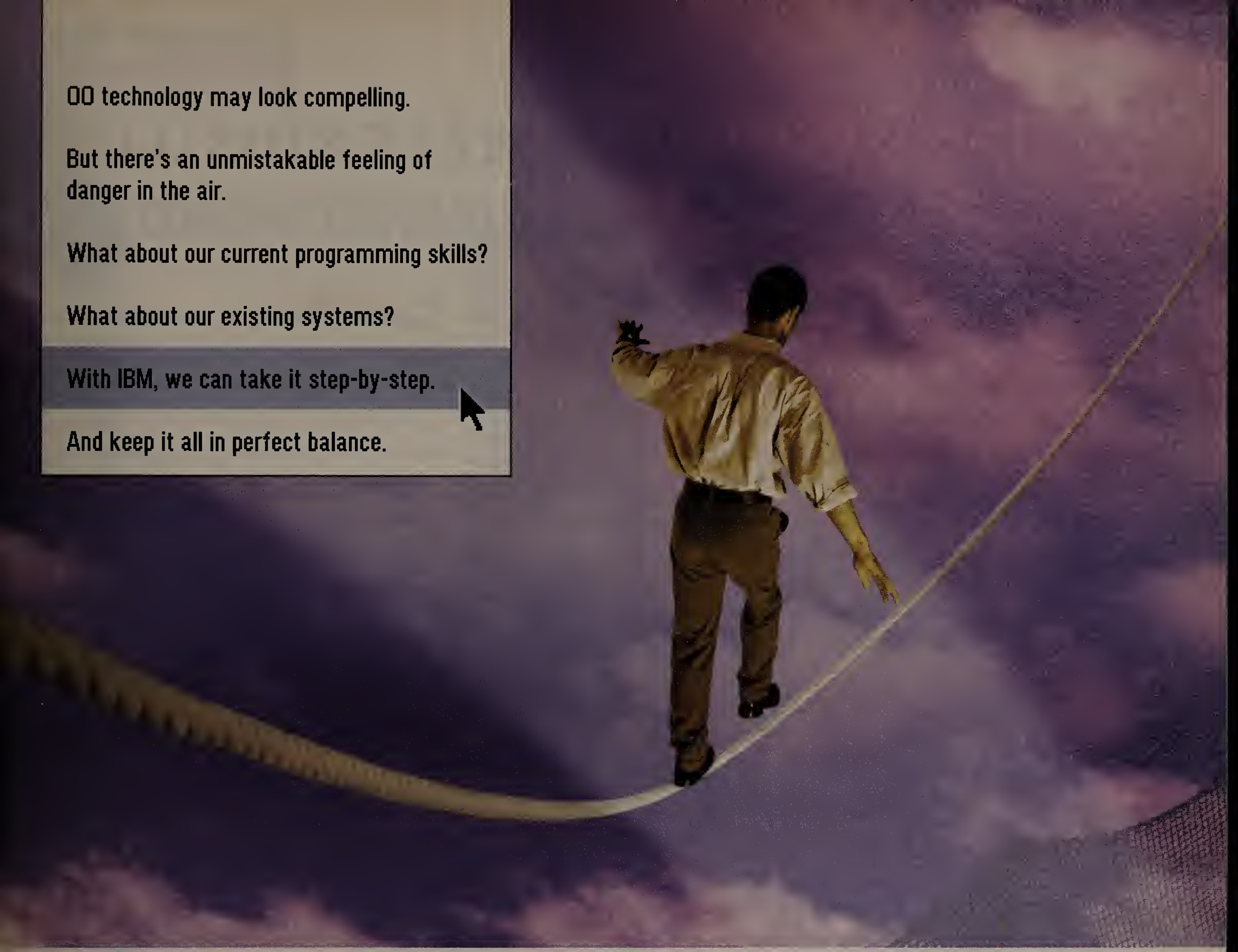
The 5th Wave by Rich Tennant

"The way the clown tells it, he was hired to deliver a balloon bouquet to the victim, who's this big computer nut—got all the equipment you can imagine. Well, it may have just been static electricity, but we're taking the clown in for questioning anyway."

Wagonload of pioneers

A who's who of networking pioneers will launch Ipsilon Networks this week. The Palo Alto, Calif., start-up will tackle the problem of making Internet Protocol more efficient for transport over ATM networks. The company will focus its efforts in rewriting the IP stack and also may announce a switch that uses the reworked code, said a source close to the group. The company has the backing of Brian Nesmith, founder of Newbridge Networks, Inc., Kalpana co-founder Larry Blair and ATM Forum executive Tom Lyon.

Taking a cue from the California Almond Growers Association (whose slogan is "Just one can a week, that's all we ask"), Apple's new CEO, Gilbert Amelio, reportedly circulated a memo to his public relations staff requesting that the PR machine churn out "at least one good story a week." Apple insiders say the CEO's gentle shove seems just a tad ambitious since there isn't much good news to report. Maybe Apple should just get rid of its entire PR staff. "Fire just one PR person a week, that's all we ask." If you have other irreverent suggestions to pass along, or news tips to share, call our 24-hour voice-mail tip line at (508) 820-8555 or our toll-free number at (800) 343-6474. News editor Patricia Keefe can be reached by phone at (508) 820-8183 or via the Internet at tish_keefe@cw.com.


OO technology may look compelling.
But there's an unmistakable feeling of danger in the air.
What about our current programming skills?
What about our existing systems?
With IBM, we can take it step-by-step.
And keep it all in perfect balance.

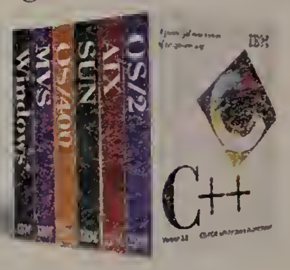
Can your software do this?

The benefits of OO can be thrilling: faster development, reduced backlogs and a real competitive edge. But the reality is there are no quick fixes. And you have to think about systems and skills in which you have already invested.

With IBM C++ technology, however, you can use a consistent set of tools to deploy fast, highly reliable applications throughout the enterprise. You can start small – on any platform – without facing an impossible learning curve.

To assure both scalability and portability, IBM's powerful C++ tools and Open Class Library are available on platforms from IBM and others.* They work seamlessly with DB2®, CICS™ and IMS,™ as well as with other host and server software. They also let you create the most efficient distributed applications.

To boost development speed, our VisualAge™ environment allows you to construct applications by graphically connecting a series of on-screen objects. As *InfoWorld* says, it's "a masterpiece of visual programming."



Visit us at http://www.software.ibm.com for details or call 1 800 IBM-3333, Dept. JA010, for a free Enterprise OO Adoption Kit. We can help you make the move to OO – one step at a time.

IBM®

Solutions for a small planet™

*IBM C++ is available on OS/2, AIX, Solaris, OS/400 and MVS (and soon on Windows 95 and NT). In Canada, call 1 800 565-SW4U. Outside North America, contact your local IBM office. The IBM home page is located at http://www.ibm.com. IBM, DB2, OS/2, AIX and OS/40 [illegible] IMS, VisualAge and Solutions for a small planet are trademarks of International Business Machines Corporation. Windows is a registered trademark of Microsoft Corp. © 1995 IBM Corp. All rights reserved.

THINKING *Enterprise* STORAGE

WORLD CLASS ENTERPRISE *Storage*

You need a storage system that can scale from your distributed offices to your data warehouse. One that you can rely on for continuous access to all mission critical information-and for security of your terabytes of data. One that will not only grow with you, but will also protect your investment. A RAID storage solution that gives you tools to centrally manage all of your data storage. With CLARiiON® you have a world-class disk array solution optimized to ensure that the integrity and availability of information throughout the enterprise is never compromised.

FOR THE *Open Systems* ENTERPRISE

Managers today need to select the best storage technology. That's why we've designed CLARiiON to be the premier open storage system for virtually any server and for any application environment. Scalability was never so easy!

Manage YOUR STORAGE

Getting a handle on data storage throughout your enterprise is easier than ever. Our ArrayGUIde™ software lets you configure, monitor and manage all of your CLARiiON arrays, with just a glance at a single graphical display.

Extended HIGH AVAILABILITY

CLARiiON extends availability of information "outside the box" to your servers. It can support automatic failover capabilities for I/O channels (Application Transparent Failover-ATF), and even clustered server failover for SUN and IBM with our GuardWare™ software. With CLARiiON, mission-critical information is always available.

INVESTMENT *Protection*

We've built CLARiiON for maximum scalability and flexibility. As your business grows and information storage needs increase, CLARiiON can easily expand with your business while on-line. And your vital information will be protected like never before. CLARiiON's entire family of products provide the utmost in heterogeneous server support.

THE *Thinking* IS CLEAR

CLARiiON is the most widely accepted storage solution. So when you're thinking mission critical storage, upgradability, data integrity, performance and connectability, think CLARiiON, which was chosen as "the best RAID product of 1995" by Network Computing Magazine.* For more information, our internet address is http://www.dg.com or call 1-800-67-ARRAY.

NETWORK COMPUTING
WELL-CONNECTED AWARD
1·9·9·5

CLARiiON
Advanced Storage Solutions

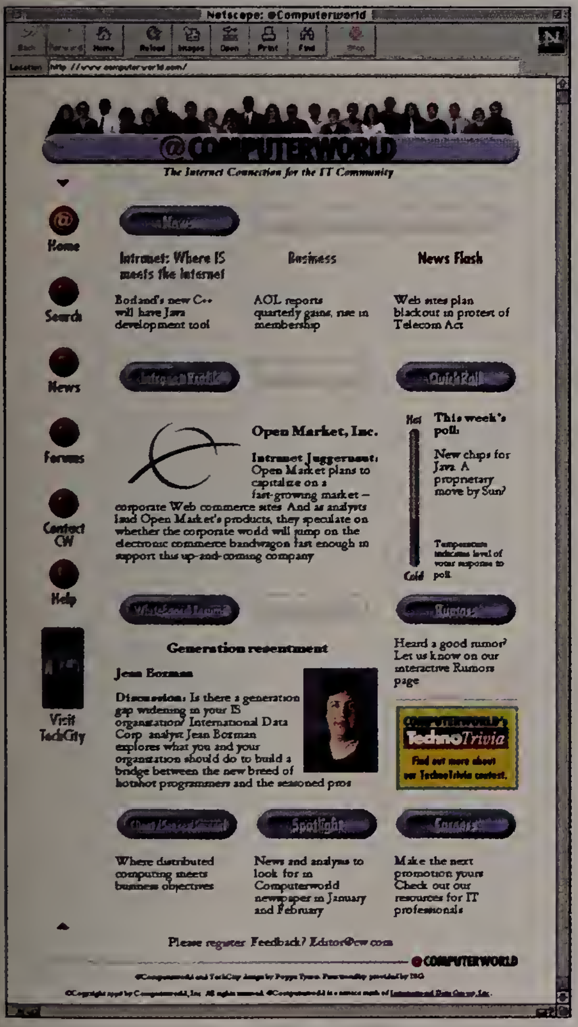
CLARiiON is a business unit of Data General Corporation. CLARiiON is a registered trademark and ArrayGUIde and GuardWare are trademarks of Data General Corporation. © 1995 Data General Corporation. All other brands and products are registered trademarks or trademarks of their respective holders.*"The 1st Annual Well-Connected Awards", Network Computing, April 1, 1995.

@COMPUTERWORLD

The Internet Connection for the IT Community

Computerworld Inc. changed the rules of the media game with the launch of @Computerworld on January 8. Within six weeks over 50,000 IT players visited @Computerworld, with the site capturing over 2 million hits. What differentiates @Computerworld from other IT publications' sites? A well-known brand and a unique editorial platform that looks at developments happening on the news and feature desks of *Computerworld* and many other industry sources and molds a newly interpreted, daily feed of information, geared for interactive use by the global IT community.

How can you connect to your customers within this environment? Banner ads that anchor various editorial pages, with hot links to your site... Single sponsorship of our Whiteboards — a two-week "live" IS editorial event led by an industry expert... advertising within @Computerworld White Papers, an electronic extension of our popular custom publishing solution for vendors looking for single-focus content on an emerging technology or issue. But we don't stop there.



The Internet Connection for the IT Community

Intranet: Where IS meets the Internet
Borland's new C++ will have Java development tool

Business
AOL reports quarterly gains, rise in membership

News Flash
Web sites plan blackout in protest of Telecom Act

Open Market, Inc.

Intranet Juggernaut: Open Market plans to capitalize on a fast-growing market – corporate Web commerce sites. And as analysts laud Open Market's products, they speculate on whether the corporate world will jump on the electronic commerce bandwagon fast enough to support this up-and-coming company.

This week's poll:
New chips for Java. A proprietary move by Sun?
Temperature indicates level of voter response to poll.

Generation resentment

Jean Borman

Discussion: Is there a generation gap widening in your IS organization? International Data Corp. analyst Jean Borman explores what you and your organization should do to build a bridge between the new breed of hotshot programmers and the seasoned pros

Heard a good rumor? Let us know on our interactive Rumors page

Where distributed computing meets business objectives

News and analysis to look for in Computerworld newspaper in January and February

Make the next promotion yours. Check out our resources for IT professionals

Please register. Feedback? Editor@cw.com

@Computerworld and TechCity design by Poppe Tyson. Functionality provided by ISG

©Copyright 1996 by Computerworld, Inc. All rights reserved. @Computerworld is a service mark of International Data Group, Inc.

www.computerworld.com

www.computerworld.com/techcity

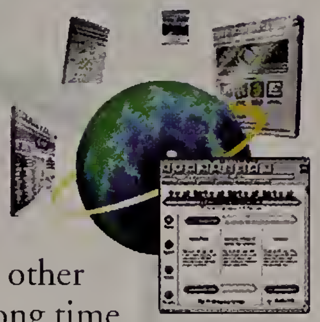
@TechCity™

The Hub of Technological Achievement

Within this city's perimeters, you'll find cyberspace media solutions not offered anywhere else. Commercial real estate that allows you to furnish your space with content-based advertising targeted directly to the needs and job functions of not only IS, but other IT buying influences as well.

- **Corporate headquarters** skyscrapers that give you primary contact with your customers the minute they enter your lobby.

- **A convention center** that hosts an ongoing virtual tradeshow — which puts an entirely new spin on the phrase "product launch."

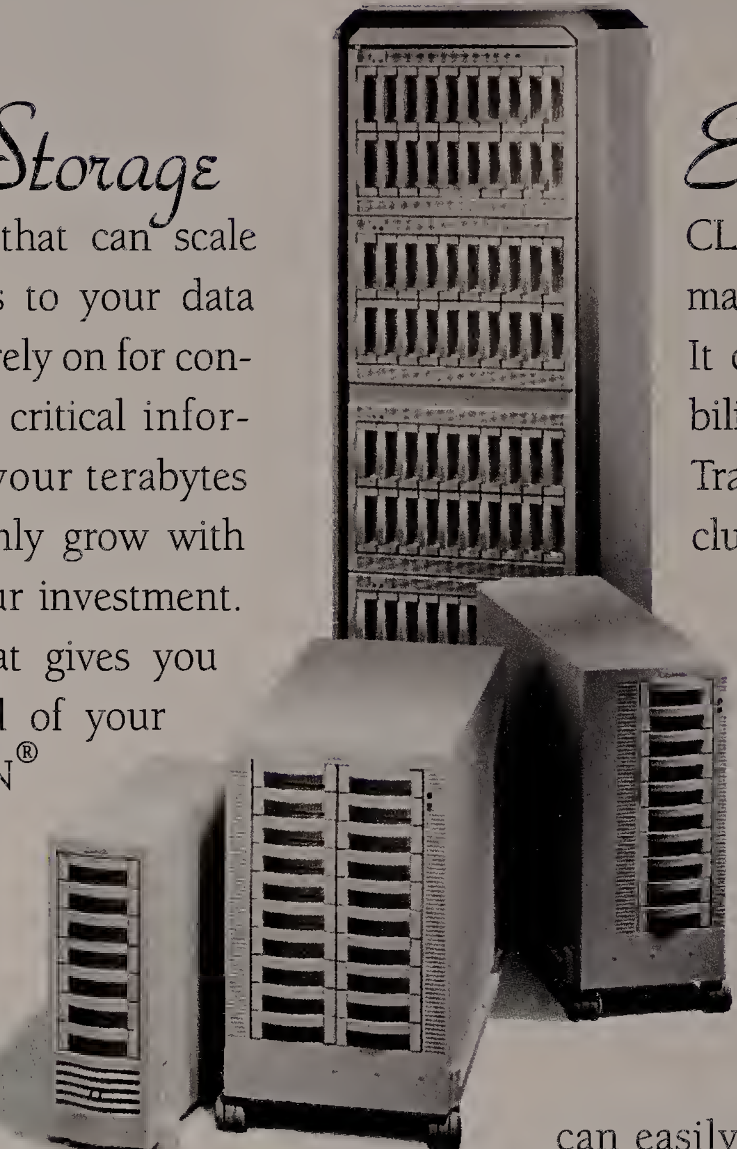


- **The TechCity home page directory** where IT "siteseers" can link to some of today's most significant vendors.

This prime real estate is surrounded by other buildings that entice visitors to stay a long time in TechCity. The TechCity Broadcast Center — a CNN-style newsroom that links them to the @Computerworld Minute, plus other Real Audio IT sites around the Web...Books Etcetera, a browsing center for the world of IT culture and insight, with book titles, essays and interactive reviews...The Box Office, where IT professionals go to book dining and entertainment for their next business trip... The Technology Investment Center, covering tech stock activity, winners and losers, including in-depth analysis of recent trends and stars.

It's a city with an unlimited range for growth. Already many leading vendors have bought corporate skyscrapers and are busy building their interior IT solutions. Exhibit space at the convention center is filling up fast. In your next meeting with your *Computerworld* sales representative be sure to go on a visit TechCity. It's worth the trip.

THINKING *Enterprise* STORAGE



WORLD CLASS ENTERPRISE *Storage*

You need a storage system that can scale from your distributed offices to your data warehouse. One that you can rely on for continuous access to all mission critical information-and for security of your terabytes of data. One that will not only grow with you, but will also protect your investment. A RAID storage solution that gives you tools to centrally manage all of your data storage. With CLARiiON® you have a world-class disk array solution optimized to ensure that the integrity and availability of information throughout the enterprise is never compromised.

FOR THE *Open Systems* ENTERPRISE

Managers today need to select the best storage technology. That's why we've designed CLARiiON to be the premier open storage system for virtually any server and for any application environment. Scalability was never so easy!

Manage YOUR STORAGE

Getting a handle on data storage throughout your enterprise is easier than ever. Our ArrayGUIde™ software lets you configure, monitor and manage all of your CLARiiON arrays, with just a glance at a single graphical display.

Extended HIGH AVAILABILITY

CLARiiON extends availability of information "outside the box" to your servers. It can support automatic failover capabilities for I/O channels (Application Transparent Failover-ATF), and even clustered server failover for SUN and IBM with our GuardWare™ software. With CLARiiON, mission-critical information is always available.

INVESTMENT *Protection*

We've built CLARiiON for maximum scalability and flexibility. As your business grows and information storage needs increase, CLARiiON can easily expand with your business while on-line. And your vital information will be protected like never before. CLARiiON's entire family of products provide the utmost in heterogeneous server support.

THE *Thinking* IS CLEAR

CLARiiON is the most widely accepted storage solution. So when you're thinking mission critical storage, upgradability, data integrity, performance and connectability, think CLARiiON, which was chosen as "the best RAID product of 1995" by Network Computing Magazine.* For more information, our internet address is http://www.dg.com or call 1-800-67-ARRAY.

NETWORK COMPUTING WELL-CONNECTED AWARD 1·9·9·5

CLARiiON
Advanced Storage Solutions

CLARiiON is a business unit of Data General Corporation. CLARiiON is a registered trademark and ArrayGUIde and GuardWare are trademarks of Data General Corporation. © 1995 Data General Corporation. All other brands and products are registered trademarks or trademarks of their respective holders.*"The 1st Annual Well-Connected Awards", Network Computing, April 1, 1995.